The Chemical Age

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Notes and Comments

The 1934 Dyestuffs Act

MANUFACTURERS and users of dyestuffs are doing their best to co-operate with a view to the successful working of the Dyestuffs (Import Regulation) Act, 1934, and it is hoped that by the sympathetic appreciation of each other's point of view and by helpful co-operative effort any differences will be settled amicably by the joint committee of makers and users, set up to discuss such subjects as prices and supplies, and that there will be little need of appeal to the Import Duties Advisory Committee. Sir Harry McGowan, at the annual meeting of Imperial Chemical Industries, Ltd., expressed appreciation of the manner in which the colour users had co-operated in the administration of the old Act and hoped that the same spirit might be maintained under the new conditions laid down by the Government for dealing with the matter in the future. Sir Henry Sutcliffe Smith reciprocated his sentiments in Manchester the other day. The Colour Users' Association, he said, had pledged itself to use every endeavour to assist in the smooth working of the Act, and so far as he personally was concerned he would use all his influence to ensure, notwithstanding any legislation upon which they might differ, that the best of relations should be maintained.

It is inevitable, however, that there should be points of difference between the two sides, one of which has been the question of the 10 per cent. tariff on intermediates used as dyewares. The Colour Users' Association, as reported in THE CHEMICAL AGE last week, has been seeking to secure the addition of these intermediates to the Free-List. Negotiations have been proceeding for six months, but a solution satisfactory to both sides has not yet been attained. A suggestion has, however, been made recently by the Colour Users' Association and submitted to the makers' representatives on the standing joint committee for consideration, which it is hoped will form a basis on which agreement can be arrived at in order that a joint recommendation shall be made to the Import Duties Advisory Committee.

Finance and Industry

DURING the past fifteen troubled years the disorders of the world have been so obviously economic rather than technical that, although in some uninformed quarters there has been a disposition to blame the inventor and the chemist as the source of all ills, most men of intelligence have perforce taken a keen interest in possible economic measures to restore prosperity. The phenomena of poverty and even starvation in the midst of plenty is one to which we have frequently referred. The inherent difficulty is one of distribution, of finding how to enable everyone to obtain goods in proportion to the manufacturing power of the world, and not as at present in proportion to a (much smaller) purchasing power. The forty-hour week, possibly an ideal theoretical measure, has been found to be beyond the range of practical politics. Inflation is unlikely to achieve its object because costs will follow prices and the improvement soon comes to a halt.

From the situation in the United States, a new idea has emerged which may well be worth consideration by economists as either a primary or a secondary measure of amelioration. We are told that the rate at which money works, that is to say, the rate of circulation, must be increased. It is of no use creating more purchasing power, or more money, if they are not used. Why has trade been bad? Is it because people do not want goods? Never have people wanted things more than during the past years when they have not been able to get them. Is it because the available capital of the individual has vanished? The capital of some individuals has disappeared it is true, but the capital existing in the world has not disappeared nor has it diminished when measured by an absolute standard. People, firms, banks, have all retained their capital unused until someone with sufficient faith has started the ball rolling, and even to-day it is not rolling very fast. In other words the available money in the world has stopped circulating.

Circulation by Compulsion

THE novelty of the suggestion arises in the methods that can be employed to prevent stagnation of capital. It is pointed out that for some quite arbitrary reason capital in the form of cash or of bank deposits is treated quite differently from capital in the form of fatcories, houses or other real assets. If the factory owner, for example, shuts down his plant, he still has to pay taxes on it, and maintenance charges, while the plant and property deteriorate. His assets are always wasting, even when not used. The only way in which he can keep them intact is to use them profitably. It is often better to use them unprofitably, *i.e.*, to operate the factory at a slight loss, than to leave them idle. However small the profit, a works will continue in as full operation as orders will warrant. The behaviour of capital in the form of money and bank balances is

quite different, and especially so where the money is surplus and the interest is not essential to the livelihood of the owner.

If capital lying idle were to be subjected to charges of a corresponding nature it is held that it would not lie idle but would circulate. The question is raised: Why should not all money not invested be taxed sufficiently highly to discourage hoarding? That is circulation by compulsion, but it is compulsion already employed upon every factory owner to make him keep his works in operation. There is much to be said for forcing money as it accumulates to turn itself into something which produces either goods or services; in the process it will circulate and be distributed. The idea is not completely new; Gesel and Irving Fisher suggested applying it to currency; to-day the suggestion is to apply it to bank balances above a minimum figure.

Where Research is Lagging

THE question arises whether taxation of money would be sufficient to cause the capital to be devoted to remunerative purposes. Suppose a tax were to be put upon capital to-day, and that as a result all capitalists immediately decided to employ their money in industrial enterprises, what enterprises would they choose? Does industry require more capital? The answer must be that we do not want more capital nor more factories. We want the great mass of people to use more goods. To erect a vast new works capable of doubling the world's production of dyestuffs would have no value in improving trade unless the world will buy double the quantity of dyed goods. Our manufacturing capacity is probably sufficient for a large increase in production over the world's present consumption. Except in so far as a proportion of the unemployed were given work, the purchasing power of the individual cannot be increased by causing passive capital to become active. We see no objection to taxing passive capital to encourage it to become active, provided care is taken not to disturb the thrift of the small man, but in our view the solution of the world's major problem is not yet in sight.

In exact contradiction of the views just recounted, and largely supporting our contention that taxation of idle capital may contribute to but not dominate industrial recovery, comes a noteworthy book " The Great Depression " by Lionel Robbins. Professor Robbins cannot believe that the cause of the world depression was the fall in commodity prices (this was the *result*, he maintains), nor technological progress, nor scarcity of gold, nor sterilisation of gold, nor even deflation; it was simply " over-investment." In Professor Robbins's view recovery demands restoration of the gold standard, removal of trade barriers, and a revival of political stability. Recent Central European events seem to have put political stability farther away than ever. In the complete disagreement that exists between economists there is a moral. It has been said that in every prediction made during the post-war years, economists have been wrong—though they have never failed to issue elaborate explanations why they were wrong. The fact is that the industrial conditions of the world are changing fast, as they have been changing for 150 years. We sadly want economic science to tell us how to meet the changes—but alas! it has been found wanting. Books on economics are all too full of theories, all too little supported by adduced facts. When Sir Henry McGowan lectured on the " Uneven Front of Research " he might well have quoted economics as a science of the utmost importance in which research was curiously lagging.

Extensions of Scientific Knowledge

THE history of scientific discovery may be written in many ways. The common method is to show how discovery has followed discovery until we are rapidly arriving at an *annus mirabilis*. No doubt that is true. It gives to the layman a very satisfactory picture of how wonderful is the man of science. It also discourages the junior and the student by making him feel that there is little or nothing left to be discovered, and that after all he would have been much better to enter an insurance company, to become a bank clerk or to open a shop. The book for which we are waiting has not yet been written. It would show how certain, how absolutely positive is the scientific world at any given time of the correctness of its knowledge. " Formerly it was supposed . . . but we now know that . . . " are words frequently used. Only a few individuals know that they know not. There are many examples from the realm of chemistry, one of which has just been brought to light.

Throughout the 19th century we *knew* that atoms were the bricks of the universe, whole and indivisible. Thus the attempts of the alchemist at transmutation were smiled upon as the childish attempts of a world not yet fully grown. In 1896, however, the discovery of radioactivity altered our conception and in the years that have passed we have come to divide the atom, to transmute elements and to discover " isotopes " which could never have fitted into the 19th century frame. We further discovered that the universe was built up of two bricks only, the proton and the electron. Recently, however, we have discovered the neutron and the positron; there is some suspicion of yet a fifth brick, the " neutrino," an uncharged particle of electronic mass. To our minds the discovery of so many bricks suggests that each of these " bricks " will later be found to be composite—but that is reserved for the distant future. The mathematical theory based upon the proton and electron showed that there could not exist more than 92 elements; the fact of the existence of a limit of 92 was freely taught until last month. Signor Fermie has now described how by bombardment of elements with neutrons (uncharged particles of mass slightly greater than the proton) he has induced artificial radioactivity, and by bombardment of uranium, the heaviest element, he has produced a new element which cannot have the atomic numbers 86 to 92, which is almost certainly heavier than uranium, which may have the atomic number 94 or 95, but which probably has the number 93. The properties of the new element —if such it proves to be—resemble those of manganese and rhenium. Upon the heels of this announcement comes the statement that there has been discovered in pitchblende, a radioactive element heavier than uranium. This may be the identical element produced by Fermi, or it may be an isotope. Thus does science progress.

Packing, Transport and Storage

The Necessity for Selecting Suitable Containers for Chemical Products

THE diversity of chemical products at the present time demands a very wide range of containers for packing, transport and storage. The choice of suitable containers may represent an important selling feature and may, in addition, have a direct bearing upon the selling price of the goods in question.

Rigid specifications in regard to permissible containers are laid down by railway and shipping companies for certain classes of goods, whilst in other cases the choice lies in the hands of the manufacturer, the supplier or the user, who is guided by a number of considerations. The container should be made of a material unacted upon by the product and one that will not cause discolouration. The material and design must be such as to afford the maximum strength necessary to withstand rough handling and accessibility for cleaning purposes may also be important.

In addition to the necessity for selecting materials of construction to counteract the corrosive tendency of certain products, much has been done to modify containers so that packing may be facilitated and a definite assurance may be obtained that the product arrives at its destination in an uncontaminated condition. In this connection there is the further question of ensuring that hygroscopic materials are not damaged by moisture in transit. At the present time too much stress cannot be laid upon the importance, from the manufacturer's point of view, of the attention given to the appearance of the package in which his products are distributed. The product which is placed on the market with a very high degree of purity demands a package which is in keeping with that standard.

Regarding the selection of materials, one instance may be cited of the use of aluminium or stainless steel drums for the transport of nitric acid and acetic acid. Where chemicals are distributed in wooden casks there is the necessity for choosing a lining material which will keep out moisture and prevent the admission of dirt and dust. Another innovation which may be seen from the illustrations in other pages of this issue is the introduction of ribbed stoneware bottles for the transport of poisonous liquids, and also special air-tight covers for the transport of materials whose corrosive nature demands a jar of acid-resisting stoneware.

Attention might also be drawn to the use of glass-lined vessels for the storage of liquids, particularly those of a pharmaceutical nature. This glass-lined ware is now of British manufacture. For the transport of powders and granular or crystalline materials there has lately been an extended use of plywood containers. Such containers give a remarkable degree of strength and are also light enough to have a favourable effect in the reduction of transport charges. The use of " square tapers " is also to be recommended for the saving of lorry and truck space in transit.

Factors Influencing Choice of Steel Containers

DURING recent years the importance of an attractively designed and well produced steel package has been increasingly appreciated by the chemical industry. The container has a definite advertising value, which should not be overlooked. Many firms long ago settled the style of package necessary to their requirements, and saw no reason to make any changes, but increased competition has compelled them to pay attention to the style, construction and cost of the containers used. Concurrently with the demand for a container of strong and attractive appearance in all the various capacities has come a demand for a reduction in price, and it is to meet these requirements that the Steel Barrel Co., Ltd., has produced a wide range of well-designed and strongly made containers at the lowest prices consistent with good quality.

Chemical firms know the importance of having a container which is absolutely sound. A leaky drum is, under the most favourable circumstances, always a bad advertisement, and may with certain fluids cause serious damage and perhaps heavy expense. For this reason the Steel Barrel Co., Ltd., has paid particular attention to the strength of its products. In cases where steel barrels and drums are not adequate transport for bulk supplies, then tank wagons, in which the company also specialises, may perhaps more profitably be employed. Corrosive conditions may dictate aluminium, glass or other forms of protective coatings, all of which can be supplied. Steel, however, still leads the field as the strongest and most economical material for tanks and containers.

Barrel-shaped packages have, in many cases, considerable advantages over other types. They are easier to handle than the ordinary cylindrical packages with rolling hoops. It has been proved in practice that one man can handle a barrel-shaped package as easily as two men can handle a cylindrical drum with rolling hoops of a similar capacity. Again, rail transport charges are considerably less on barrel-shaped packages owing to the extra weight of the rolling hoops in the other type. Further, the life of a well made barrel is actually longer than that of the usual type of drum, as, sooner or later, the hoops are apt to come off or get broken. The largest users of steel packages are the large petrol and oil companies, and the fact that these firms—using hundreds of thousands of steel barrels—without exception, use the barrel shape package speaks for itself.

Drums with H-section rolling hoops are still used considerably in the chemical trade, although nothing like so much as formerly. They are chiefly employed for export, many foreign firms still calling for this type, and British manufacturers having practically no choice in the matter. It is also a necessary package for the conveyance of substances where the quantity has to be gauged by the Customs and Excise officers by measurement with a dip-rod, as, for instance, in the case of alcohol. The drum with pressed-out rolling hoops is not an intrinsically good package, but it is used where a purely non-returnable one-journey drum is required, and where the cost of "clothing" has to be reduced to a minimum. These packages, made by mass production, are the cheapest obtainable steel packages for the conveyance of lubricating oil, paints, varnishes, etc. An improvement in this type, due to the Steel Barrel Co., Ltd., is the " R " type, in which the pressed out rolling hoops are externally strengthened with heavy mild steel strips shrunk on to the body and rolled out with the body, making a homogeneous rolling hoop of great strength and durability. This type has been tested by the Railway Clearing House authorities, and passed by them as suitable for the conveyance of inflammable liquids. It can, therefore, be used for the home trade for every purpose for which a drum with the H-section rolling hoops can be used. It is probably really a stronger drum than the latter, as there are no separate rolling hoops to become loose or broken.

The Steel Barrel Co., Ltd., are pioneers in this class of production. They were the originators of the steel barrel, and have progressed continuously in providing the chemical and allied trades with specialised containers. A great deal of the plant in the company's premises has been designed and produced by the company, who are therefore in a position to undertake specialised work of a description not found in the ordinary market. Their designing and research staff have produced many containers now used as standard in many chemical manufacturing firms.

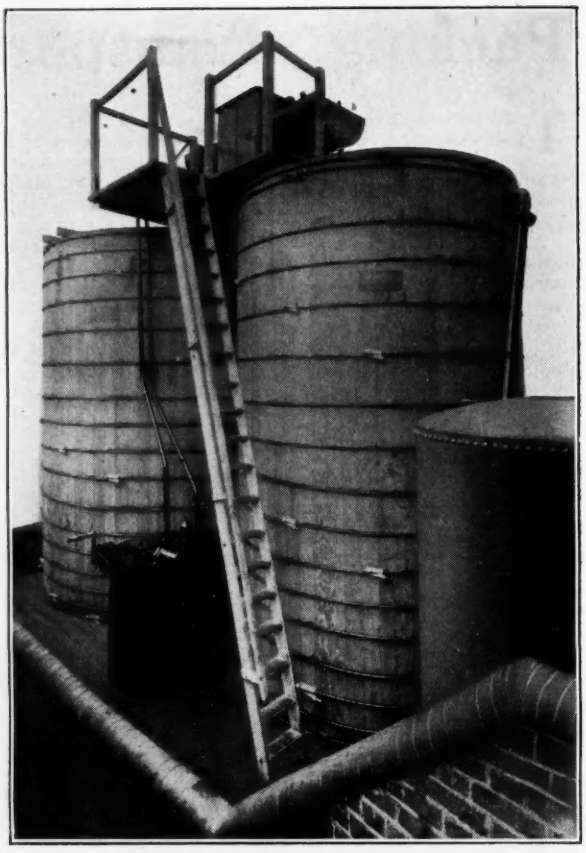
Research in the quality of certain steels has enabled the company to give sound advice as to the quality required for a definite chemical. Welded drums from 1 to 20 gal. capacity are welded by resistance welding process in gauges from 18 to 22 B.G. and heavier drums (from 20 gal. to 90 gal. capacity) are usually manufactured in thicker material. These are used for the conveyance of various chemicals and spirits.

The manufacturing specifications of the drums vary according to the liquids they are to carry, and also the method of transport; but, generally speaking, sheep dip, disinfecting fluid, and insecticides are carried in the lighter electrically welded drums from 1 gal. to 10 gal. capacity. Strong sulphuric acid is generally carried in rolling-hoop drums, or barrels of 32-gal. (5 cwt.) or 64-gal. (10 cwt.) capacity, and these containers where used for the home trade are generally manufactured of heavy gauges tested to 20 lb. pressure per sq. in. Bung fittings for this type of container should have a male thread boss with a female thread cap closure; and an important fitting where containers are likely to be returned, and in stock for some time, is a vent fitting to enable the generated gases to escape.

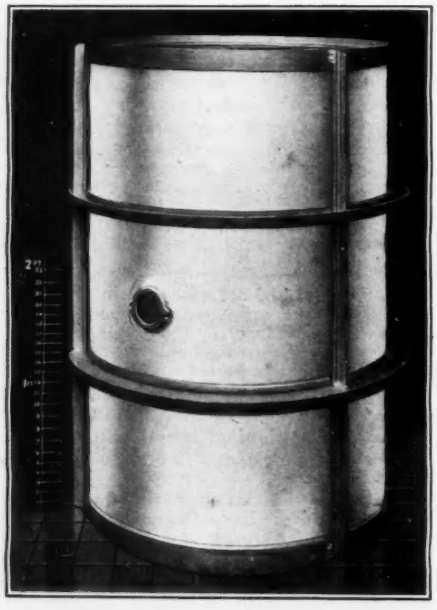
For other liquids the bung fittings vary in design, according to the nature of the contents, but, generally speaking, fall into two classes. One type commonly used on smaller drums is the ordinary cork neck, closed by means of a cork, and in many cases it is required to fit a tin capsule. Where, however, the contents are of a dangerous nature, it is more usual to have a screw bung. For certain corrosive liquids steel containers are supplied coated with a suitable metal to prevent action taking place between the liquid and the steel; such metals vary according to the nature of the liquid but the following coatings may be mentioned: Tin, spelter (galvanising), lead, aluminium and Monel metal. Steel containers are used in large numbers for the following, among other chemicals: Ammonia (liquid) acetone; acid, sulphuric (strong); boiler preservatives; carbon bisulphide, sheep dip; disinfecting fluids; ether; insecticide; weed-killer, and various petroleum spirits and tar distillation products.

Moisture Resisting Cotton Bags

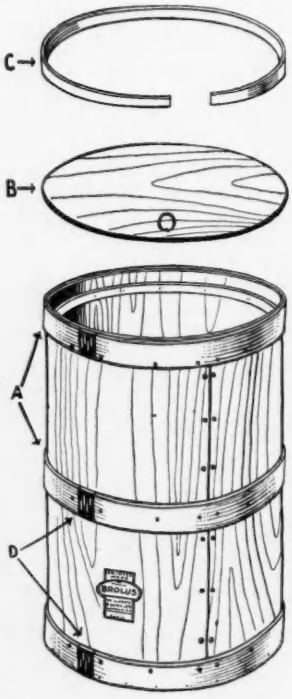
MANY classes of products, including fine drugs and chemicals, dry colours, food preparations, etc., when shipped abroad in cotton bags, are apt to deteriorate from the effects of moisture, and in certain damp tropical countries it is difficult, if not impossible, to keep such materials in their original packages. Export houses have found that food products in the ordinary bags, when exposed for only a brief time to rain, will deteriorate, and the shippers and manufacturers may find such packages and their contents sent back to them.



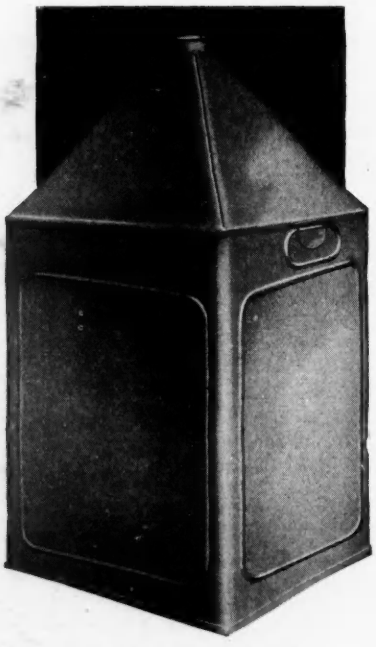
Wood Vats at a Chemical Works (Carty and Sons, Ltd.).



All-Welded Aluminium Drum (Aluminium Plant and Vessel Co., Ltd.).



Brolus Plywood Barrel (W. Lusty and Sons, Ltd.).



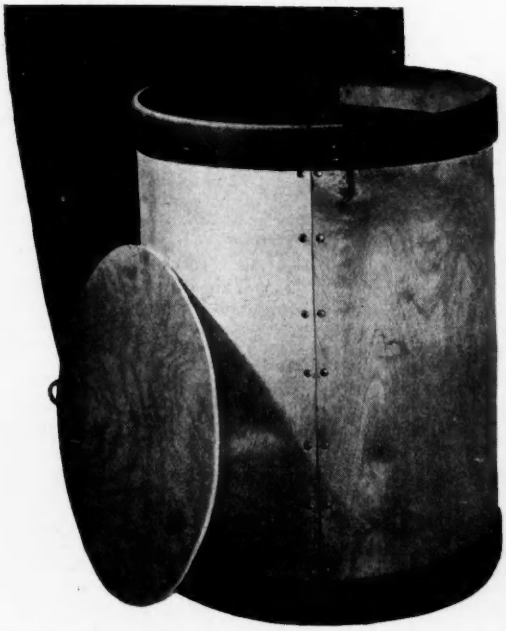
Square Taper (F. Robinson and Co., Ltd.).

Zulo Steel Carboy Hamper (R. and H. Leigh and Sons).

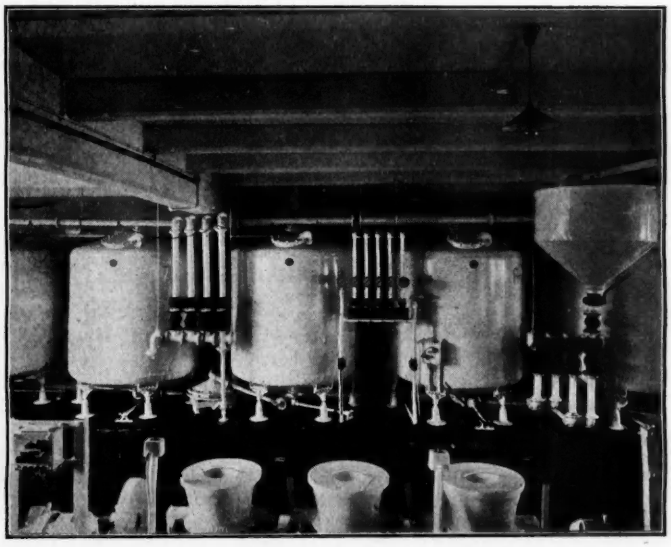
Barrel-shaped Containers have many advantages over other types, although H-section rolling hoops, as shown in centre, are still used considerably in the chemical industry. (The Steel Barrel Co., Ltd.)

Pfaudler Glass Lined Equipment for Storage of Perfumery (Enamelled Metal Products Corporation, 1933, Ltd.).

The Guelph Cask (Guelph Patent Cask Co., Ltd.).



Cylindrical Keg of Venesta Birch Plywood (Venesta, Ltd.).



Pfaudler Glass Lined Equipment for Mixing and Storing Kolynos Dental Cream. (Enamelled Metal Products Corporation, 1933, Ltd.)

There has, therefore, long been a demand for a cotton or other textile bag which is impervious to moisture, or moisture resisting, for putting up materials of the class referred to for export. Such bags must not affect their contents, must show no change in colour, texture or strength from the ordinary cotton bag, and they must be offered at a price which will not lessen the demand, but on the contrary, should rather stimulate demand. W. H. Feltham and Son have, after some years of experimenting, discovered a preparation which renders their cotton bags moisture resisting, and at the same time meets all the requirements above mentioned. A sample of this cloth shows that there is nothing in its appearance or feel to distinguish it from ordinary cotton, and yet, as tests show, it is decidedly moisture resisting, and should therefore supply the long-desired protection against the effects of humid atmospheres.

Aluminium Drums Give Satisfactory Service

WHILST drums of various capacities and metals have been constructed by The Aluminium Plant and Vessel Co., Ltd., their main activity in this connection has been confined to the production of the standard A.P.V. 96 gallon aluminium drum, illustrated in page 118. This is an all-welded aluminium drum, heavily reinforced by a mild steel framework. It is a standard form of container in this country for the transport of acetic and nitric acids, and as such was submitted to the most rigorous tests by the railway authorities before being passed for service. Very special attention has been paid to the design of the outlet—a very necessary precaution where dangerous chemicals have to be handled.

Acid Storage Tanks Need Reliable Linings

STOPPAGES, loss of time, repairs and maintenance costs can be considerably reduced if in the construction of acid tanks of any description highly efficient acid resisting materials are employed. The remarkable properties of the "KaBe" acid, alkali, oil and water resisting products have enabled the problem of corrosion in practically all its forms to be successfully combated, and maintenance costs almost entirely eliminated. Pickling tanks, acid storage and transport containers, bleaching and dyeing vats, can be entirely constructed, or existing tanks lined, to resist any form of corrosion by the use of one or more of the "KaBe" materials. These materials which are supplied in this country and the British Empire by H. Windsor and Co., Ltd., comprise a large and complete range of acid, alkali, heat and hard wear resisting tiles, plain and glazed, flooring compounds, putties, mortars, lacquers and paints, which afe inert to every acid, alkali and salt, whether solid, liquid or vaporous. Tank linings and taks constructed entirely of "KaBe" materials will stand up to the severest working conditions, are definitely leakproof and resistant to acids and alkalies of any concentration, cold or boiling.

Cylindrical Plywood Kegs Offer Good Resistance to Damage

MANUFACTURERS are gradually getting the right perspective in regard to the design and construction of packages considered in respect of the products they are to carry. "Any packkage" is no longer "good enough" for those manufacturers who take a justifiable pride in their products, to which science and research have both made lavish contribution. The "best only" is now insisted upon.

What type of pack *is* the best for chemicals in powder or crystal form? Without any hesitation, Venesta Ltd. say it is the cylindrical plywood keg or barrel. Judged by its strength, its lightness, its security, its shape for easy handling, the saving it effects on freight measurement (as compared with the bilge type), and lastly by its increasing popularity amongst the chemical trades, the plywood barrel stands pre-eminent. For well over a quarter of a century Venesta Ltd. have been recognised as pioneers and experts in all forms of plywood packages, both square and cylindrical. Their famous Venesta birch plywood—which is made with insoluble waterproof cement—is admirably suited for the construction of kegs and barrels. It possesses the advantages of lightness combined with strength, which is further greatly increased in the cylindrical form.

As originators of the cylindrical plywood keg, Venesta Ltd. have always kept abreast of the requirements of the trades for which they cater. New types and improvements in construction have been introduced from time to time. A great advance in construction was made last year, when "the all plywood barrel of riveted construction throughout" was put on the market—the component parts of which are assembled as a complete unit. This has resulted in greater strength —greater rigidity—and an improved appearance. They have now those outstanding qualities which places them in the forefront of cylindrical containers. Special "A.D." barrels for aniline dyes are now fitted with an improved type of gasket which has only been perfected after long experiments. This eliminates the remotest risk of any particles becoming detached and mixing with the dyes. This barrel is now the accepted standard pack for aniline dyes and many other chemical products; it is siftproof against the finest powders.

The construction of Venesta barrels is not haphazard, but on a carefully calculated basis, by which the strength of the container is increased proportionately to the capacity and the content weights they have to carry. To mention one point amongst others, the heads are graduated in thickness according to the diameter, thus making the most vulnerable part of the barrel equally as strong as the body. Venesta barrels are made in sizes to meet every requirement, and will safely carry up to 4/5 cwt. of contents. Equally suitable for home trade or export, they inspire confidence, add prestige and create new business.

Glass Carboys Need Steel Hampers

NOTWITHSTANDING modern methods of transport, the glass carboy still claims a prominent position with manufacturers for the distribution of acid. It is nearly 60 years since willow wicker baskets began to be supplanted by hampers made of steel, R. and H. Leigh and Sons being the original inventors and patentees in 1876. It was at the time of the Zulu War in 1879 that these black-coated metal hampers were first called "Zulos." More recent practice has called for packing in doubles for small lots of acid by rail or for shipments abroad. The iron safety crate is largely employed for this purpose. Iron baskets of similar construction are also used for packing stoneware jars of about 5 gallons capacity. For those users of acid who have occasion to draw off only small quantities at a time a carboy tilter of some kind is desirable. Leigh and Sons also supply one of these tilters which is adjustable to take carboys of 10 to 14 gallons capacity.

Steel Drums Are Produced in Great Variety

FOR many years F. Braby and Co., Ltd., have specialised in the production of steel containers, considerable quantities of which have been supplied to the chemical trade. In the main, the type of drum used is known as the "A" type (Fig. 1). This drum is made in capacities of from 20 to 150 gall., and has proved very satisfactory as a returnable container. The specifications regarding capacity and gauge of material differ greatly but a large stock of suitable steel sheets is maintained, and the makers can usually give prompt delivery to almost any specification.

The chemical trade has also made considerable use of the "C.S.C." type drum (Fig. 2). This drum is fitted with a 12 inch diameter opening in one end of the drum, the cover being quickly secured by means of five set screws which fit into a steel stiffening ring. The rolling hoops are pressed from the body of the drum, and 1¾ inch half oval end bands are shrunk on in such a way that it is almost impossible for them to become loose. Many thousands of these drums have been delivered to one well-known concern, who speak very highly of them.

Manufacturers of moulding powders and similar goods have for some time past been packing their products in the "D.S.C." type of drum (Fig. 3). This is a light weight and very low priced container, fitted with an 8¾ inch diameter embossed opening in one end of the drum, with an extra heavy detachable steel cover. This cover is held in position by a steel bolt passing through the cover and screwing into a V-section steel bridge piece inside the container. The closure is rendered airtight by means of a rubber washer. Large numbers of these drums have been exported to many parts of the world, and have given complete satisfaction.

Three further illustrations are of special drums supplied to the chemical trade. If buyers require special containers F. Braby and Co. are at all times ready to produce them, and give friends the benefit of their experience. Fig. 4 shows a heavy gauge returnable container which was supplied to a well-known manufacturer of edible fat. It is of 50 gal. capacity, is fitted with a quickly detachable top and is galvanised inside and outside. Fig. 5 is an alternative type of removable head; with the cover removed it is possible to thoroughly clean the inside of the drum. Fig. 6 is of 45 gal. capacity and is fitted with a quickly detachable cover; it can be made from steel of any gauge up to $\frac{1}{8}$ inch.

During the last few years drums made from stainless steel have regularly been supplied to certain sections of the

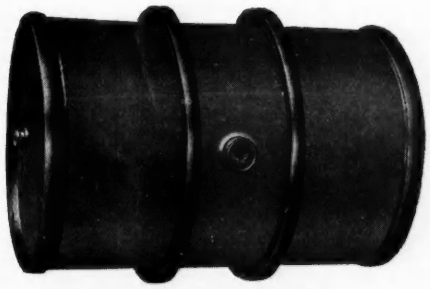


Fig. 1.—" A " Type Drum.

Fig. 2.—" C.S.C." Drum.

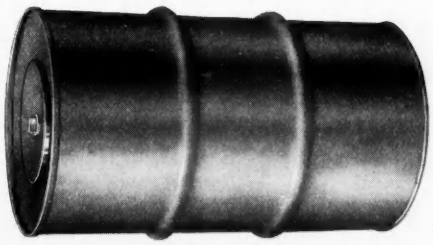


Fig. 3.—" D.S.C." Drum.

Fig. 4.—Heavy Gauge Returnable Drum.

Fig. 5.—Alternative Type of Removable Head.

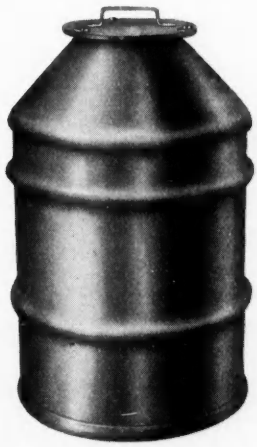


Fig. 6.—Drum with Quickly Detachable Cover.

Fig. 8.—" D.R.T." Drum.

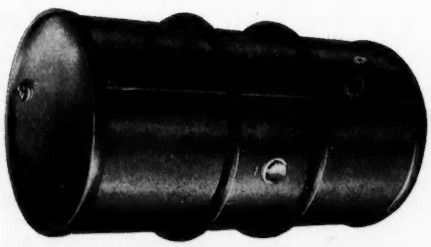


Fig. 7.—" S.S.A." Stainless Steel Drum.

The very wide range of steel drums which are available is well illustrated by the manufactures of F. Braby & Co., Ltd., which are illustrated above, and to which reference is made in the accompanying article, "Steel Drums are Produced in Great Variety."

chemical trade. The first cost of the "S.S.A." type stainless steel drum is, of course, very high but judging by the number of repeat orders which have been received it can be assumed that satisfactory service is obtained from them. Makers of powders and crystals will also be interested in the "D.R.T." type drum (Fig. 8). Here the cover is held in position by a half round section steel band which is secured by a single non-detachable screw, or in an alternative design, by the closing of a small lever. The top of the drum is beaded and fitted with a detachable cover with a moulded rubber packing ring. These drums are of low cost, and have given satisfaction to a large number of regular manufacturers.

The Square Taper is Attractive and Space-Saving

MANY of the special packages made by F. Robinson and Co., Ltd., are well known, particularly the square taper and P.T.L. keg, but one is apt to overlook the fact that this firm produces and has produced for many years a large range of standard containers. The old type of ternecoated or pure tinned double hooped drum is still hard to beat for strength and is particularly suitable for almost any liquid. This drum is ideal for export, providing a safe and clean container. Home trade drums are made from ternecoated sheets as well as black iron and this lighter type can be fitted with hoops, so that an export drum cheaper than the standard can be provided. Other cylindrical drums include those with all seams welded. There is also still a market for a really strong double hooped cylindrical taper made in comparatively small quantities, and Robinsons produce such a taper which will give years of service.

The outer cover is almost as important as the contents and it is being appreciated that sales of any product are assisted by the useful, as well as attractive, container. The square taper is an outstanding example of this and it is a fact that fillers are finding the slight extra cost of the square taper is fully justified by results. It should be mentioned that the square taper is made from ternecoated or pure tin sheets and compares favourably in price with ordinary cylindrical drums made from the same material, but it is, of course, rather dearer than a drum made from uncoated black sheets. The ease with which the square taper can be emptied is remarkable and is such that whereas a drum is often fitted with a tap, there is no need for this expense, so that a considerable saving can be effected. Decoration is another important aid to sales and for large quantities can be done at a reasonable price. The square taper lends itself to attractive decoration and the coating of the metal ensures a good finish.

Another well-known package is the P.T.L. keg, originally designed for carrying paste products but now made (when specially ordered) to carry liquids of the consistency of liquid paint. This keg is made in several weights, but owing to the construction it is usually found that a fairly light keg is quite suitable for export. The bail handle fitted on the smaller sizes makes the P.T.L. keg into a useful paint-pot, and this point is appreciated by the actual users. F. Robinson and Co. also make drums up to 50 gallons capacity and are in a position to quote low prices and give good delivery; in addition to drums, kegs and tapers, they make all classes of tin canisters in an enormous number of sizes.

Metal Boxes Incorporate Many Refinements

AS a result of intensive research by chemists and technicians, the metal container of to-day offers unparalleled advantages as a package for chemicals, both from the utility and publicity angles. The chemist has evolved lacquers which protect the metal from attack by such corrosives as acids and caustics, thus placing metal containers on a footing with glass and eathenware, whilst eliminating their disadvantages such as cost, breakage in transport, etc. Skilled technicians have invented curled edges, giving easy assembly of lid and body, with entire absence of danger from cuts. Solders have been introduced to give positive sealing of body, whilst, for liquids and semi-liquids, efficient, quickly fitted caps, seals and closures have been devised, freeing the packer from losses due to leakers and deterioration. Even the problem of packing poisons in metal containers has received attention, and it is now possible to procure tins with corrugated sides which signal their message even in the dark, when it is no longer possible to read the fact that the contents are "Poison." Vacuum packing, and inert gas processing each have their own applications to the problems of efficient protection and preservation of chemicals.

Such wide scope exists for the metal container in the field of chemical packaging that it has been possible only to skim lightly over the subject. Manufacturers wishing to explore more fully the advantages of metal as containers for their products should get into touch with The Metal Box Co., Ltd., whose technical and designing staffs are willing to give advice and co-operation on all packaging problems.

New Drum Designs Offer New Means for Closing

CLOSELY allied with the advances which take place in the chemical industry must, of necessity, be that of packages. In this connection Todd Bros., who have been closely related to the chemical industry since 1859, are always devising new designs in drums to keep pace with the industry's requirements. At present sizes from 4 in. by 4 in. to 42 in. by 24 in. diam. are supplied in various gauges from 18 gauge and lighter. This firm, moreover, is exceptionally well placed with plant and experience to supply light steel drums and kegs for chemicals in solid, powder, lump, crystal or liquid form, suitable closures being provided, whilst the containers are of various strengths to suit the material which is being packed and the amount of handling the packages are likely to receive whilst in use.

The drums made by Todd Bros. are supplied in black steel either plain or protected internally by coatings of special varnishes, lead-coated steel, galvanised steel or tinned steel, and with closures including necks or screw bungs, flanged holes and lids of various sizes to solder down or expand in (an expanding tool of novel design being supplied for the latter) special screw lids, clip lids, crossbar clamp lids, and a range of patented full-open-top drums which are particularly suitable for and convenient to the chemical industry. Notwithstanding the extensive range of packages already manufactured, this firm welcome packing problems and will willingly co-operate in developing new types if necessary, their extensive experience being at the disposal of clients. The works and plant are up-to-date in design and lay-out, and supported by practical experience are qualified to deal satisfactorily with inquiries and orders.

Glass-lined Storage Equipment Avoids Contamination

THE smooth glass lining of British Pfaudler equipment affords no crevices in which harmful bacteria may multiply. Cleaning Pfaudler equipment does not necessitate drastic scouring methods. Its effectiveness has been proved again and again by the trouble-free operation of numerous installations in every-day use. Many chemical products were developed in laboratory glassware. Glass is relied upon in the laboratory because it is the only medium which can always be relied upon for accurate results. Accordingly, products manufactured in Pfaudler glass lined equipment on a commercial basis can have the same degree of purity as the experimental batch made in the laboratory. Glass is non-absorbent and does not contaminate the most sensitive materials. Pfaudler glass lined equipment also prevents loss of product through absorption and effectively guards sensitive and volatile liquids against deterioration.

Products that are being prepared (wholly or partially) in Pfaudler glass lined equipment include alcohol, bismuth and pepsin, synthetic castor oil, camphor ointment, citrate of magnesia, cod liver oil, cold cream, disinfectants, edible oils, emulsions of various kinds, essential oils, face creams, flavours and extracts, gelatine, glycerine, glucose, gums, insulin, photographic chemicals, liquid soap, liniment, liquid foods, malt products, meat extracts, ointments, perfumes, quinine, lacquers, resins, shellac, salves, shaving creams, serums and vaccines. Due to a wide variance in the type of service required of chemical process equipment, Enamelled

Metal Products Corporation (1933), Ltd., have developed different types of equipment with glass linings that will best meet these conditions. Consequently when making inquiries it is requested that information be given regarding the nature of the product, details of any acids present, degree of concentration, and general operating conditions.

Wood Vats Should Have Definite Quality Features

A MANUFACTURER having to make, use or store chemicals is faced with the problem of the container. His acid will destroy all metals except possibly those which have been made artificially acid resistant at a cost which makes the proposed container prohibitive in price. He has perhaps tried various linings with disappointing results. He then finds that the natural resistant properties of wood, combined with moderation in price, make the unlined wooden vat the happy solution of his difficulty.

The reliability of a wooden vat or tank involves several "musts." The timber *must* be of the right kind for the job, it *must* be thoroughly seasoned, and all its natural defects such as centres, sapwood, etc., *must* be strictly eliminated. Finally, the vessel *must* be made by an experienced vat-maker; many are the manufacturers who find it definitely does not pay to let the staff carpenter "have a shot at it!" Wooden vessels are required for the artificial silk industry, as developer tanks for the film industry, as brine tanks for water softening, as tanks for new speeded-up pickling processes, and for the many other demands peculiar to our present-day highly organised industrial life. Carty and Sons, Ltd., make these and many other types of wooden vats and vessels.

Steel-Hooped Plywood Barrels Give Perfect Rigidity

RAPID strides have been made in the production of "Brolus" plywood barrels, and there is now available a very varied range for the packing of various chemicals, paint powders, food products, etc., the barrels having either metal or wooden outer hoops, and can be supplied to meet any individual requirements. The sizes have been arranged to give a capacity from 300 cc. to 22,000 cc. These barrels are British made by W. Lusty and Sons, Ltd., who have held a reputation for over 60 years for sound, honest manufacturing. This firm have only recently taken up the manufacture of wooden hoop plywood barrels and are endeavouring to push these as far as possible.

The principal feature of the steel-hooped plywood barrel is lightness combined with an abnormal resistance to damage. There are one or two steel ribbed centre hoops according to the depth of the barrel. The tapered lid is set in a groved steel hoop. Two ribbed steel external security hoops are provided at the top and bottom. These security hoops are made slightly smaller than the barrel body allowing the barrel during manufacture to be compressed into the hoops with a powerful press, thereby guaranteeing perfect rigidity and a package, proof against leakage to most dry substances, no matter how finely divided. Metal cleats are provided to ensure safe fixing of lid and bottom. The barrel is particularly suitable for packing tins filled with semi-liquids as there are no inside rebates for the lid to rest on, bringing the whole surface of the body of the barrel to bear up against the tin.

Stave-built Casks must be Built to Eliminate Leakage

GUELPH casks have been in vogue for over 50 years. Distinct from plywood casks, no glue of any kind is necessary in their manufacture. Hence, they are free from odour and particularly suitable for certain products where this is a necessity. The Guelph Patent Cask Co., Ltd., have their own forest lands in the birch-belt of Quebec, and it is from this hard wood that the cylinders are made and bound.

The method of construction adopted for Guelph casks is such that inner stave joints are covered by outer staves, and *vice versa*, so that all are sealed. In addition to this, linings of other materials can be fitted if desired. The outer hoops binding the cylinders are spaced fairly close together, giving extraordinary strength and at the same time acting as a buffer between the contents and other containers during transit, ensuring satisfactory delivery. Types are made to suit individual requirements of the products to be packed, and in this respect style, size and strength requisite are all fully considered by the makers, the result being what might be termed a tailor-made job. Diameters range from 8 in. to 22½ in. and lengths are cut to requirement up to 36 in. Factories in London and Manchester supply the demands of industrial centres throughout Great Britain, and casks carrying up to five cwts. for export abroad have given complete satisfaction. The makers claim that more sturdy casks can as easily be supplied if occasion demands.

The attention of the company has been drawn to the fact that "Guelph type casks" of inferior make have been offered to manufacturers, and ask us to state that genuine "Guelph" casks are made only in the factories of The Guelph Patent Cask Co., Ltd.

New Light Metal Alloy

Novel Features Obtained by Addition of Cerium

UNDER the name of Ceralumin "C," J. Stone and Co., Ltd., have introduced a new light aluminium alloy which has been developed to meet the demand for an alloy of low specific gravity and high strength, combined with good casting properties. The composition of the alloy, which is covered by British Patent No. 403,700 is copper 2.5, nickel 1.5, magnesium 0.8, iron 1.2, silicon 1.2, cerium 0.15 per cent., the remainder being aluminium.

Investigations in the company's laboratories have established the fact that, in addition to its refining action on the macrostructure, cerium allows the beneficial mechanical effects of a high iron content to be obtained by suppressing the embrittling iron-aluminium constituent which is otherwise liable to be formed. In addition the small amount of cerium also confers on the alloy important advantages in the foundry; Ceralumin "C" has extremely good "running" properties and gives castings having a smooth clean surface and an attractive appearance.

The heat-treatment applicable to this alloy is quite simple. The castings are maintained at the solution temperature of 515° to 535° C. for four to six hours and then quenched in water; ageing is achieved by heating to 175° C. for 16 hours followed by quenching in water. The risk of distortion at the solution temperature is no greater than that involved, for example, in heat-treating "Y" alloy at 520° C., and careful measurements on castings having unfavourable features, such as overhung arms and bosses, have failed to detect any distortion as the result of heat-treatment.

In the heat-treated condition Ceralumin "C" presents an excellent combination of high tensile strength at ordinary and elevated temperatures, high elastic limit and high Brinell hardness. These features are given in detail in the table, but special attention must be drawn to the very high fatigue strength (Wöhler, 20 million reversals) of ±8.25 tons per square inch, a quality which should prove of special interest to designers anxious to take the fullest advantage of the properties of available materials. The alloy is suitable for high-duty service in the form of die-castings, chill castings and sand castings, and it is anticipated that it will find a useful field of application in the aeronautical and automobile industries.

If the artificial ageing treatment is replaced by ageing at room temperature for five days, a modified form of the alloy is produced which is called Ceralumin "D." By this means a somewhat lower tensile strength is obtained, but the ductility is considerably increased. This modification of Ceralumin is intended for purposes where extra toughness is required in castings.

THE French "Journal Officiel" of June 26 contains a Decree and Order, dated June 25, which apply restrictions to the import into France of natural camphor, crude (common and "Formosan" camphor and the like, in powder) and refined, and of artificial or synthetic camphor (Tariff No. 118). Import is subject to individual licence granted by the Customs on the advice of the "Confédération générale de la production française, 6 rue de Messine, Paris," to which applications should be addressed.

The Chemical Age Lawn Tennis Tournament

The Singles Semi-Finalists

THE fourth annual CHEMICAL AGE Lawn Tennis Tournament has been carried a stage further this week by the completion of the fourth round matches in the singles, the results being as follows :—

L. F. Grape (Borax Consolidated, Ltd.) beat L. Giltrow (Williams, Hounslow, Ltd.), 9-7, 6-2.

P. A. Tunstall (Salt Union, Ltd.) beat S. E. Chaloner (Monsanto Chemical Works, Ltd., Ruabon), 6-4, 7-9, 6-1.

Amended details of the matches still to be played are as follows (the remaining doubles semi-final was arranged to be played on Thursday evening, but the result was not to hand to the time of going to press) :—

DOUBLES—FINAL.

Hawley, F. G., & Haines, J.
Anglo-Persian Oil Co., Ltd., Britannic House, Finsbury Circus, London, E.C.2. (National 1212.)

v

Chaloner, S. E. & Thedford, C.
Monsanto Chemical Works, Ltd., Ruabon, North Wales. (Ruabon 3.)

or

Prosser, V. J., & Baxter, A.
John Haig & Co., Ltd., Kinnaird, House, 2, Pall Mall East, London. (Whitehall 1040.)

SINGLES—SEMI-FINALS.

Bruce, R. N. B. D.
Gas Light & Coke Co., No. 1 Laboratory, Kings Road, Fulham, S.W.6. (Fulham 5531.)

v

Baxter, Albert.
United Yeast Co., Ltd., 238, City Road, London, E.C.1. (Clerkenwell 0303.)

Grape, L. F.
Borax Consolidated, Ltd., Regis House, King William Street, London. (Mansion House, 8332.)

v

Tunstall, P. A.
Salt Union, Ltd., 20, Water Street, Liverpool. (Central 4370.)

By kind invitation of the Anglo-Persian Oil Co., Ltd., the finals are to be played at the Britannic House Club, Kangley Bridge Road, Lower Sydenham, on Saturday, September 15. THE CHEMICAL AGE silver challenge cups will be awarded to the winners of the doubles and singles respectively, to be held jointly by them and the firms they represent, for twelve months. In addition Thomas Hill-Jones, Ltd., of Invicta Works, Bow Common Lane, E.3, have kindly promised to present "Invicta" silver statuettes to be awarded outright to the winners of the doubles and the singles, and Mr. W. Lloyd-Willey, director of the same company, is presenting silver statuettes of similar pattern, to be known as the "Lloyd-Willey" statuettes, for each of the three runners-up.

The British Association Meeting at Aberdeen

Arrangements for the Chemistry Section

THE general presidential address to the meeting of the British Association at Aberdeen will be delivered on Wednesday, September 5, at 8.30 p.m., by Sir James H. Jeans, F.R.S., whose subject will be "The New World-Picture of Modern Physics."

The presidential address to the Chemistry Section will be delivered by Professor T. M. Lowry, F.R.S., on "Physical Methods in Chemistry." (Thursday, September 6, 10 a.m.)

On Thursday, September 6, the following papers will be read before the Chemistry Section :—Dr. R. G. J. Fraser, "Applications of molecular rays to chemical problems." Dr. H. de Laszlo, "Determination of molecular structure by electron-diffraction." Dr. S. F. Boys, "The origin of optical rotatory power." Optical properties of conjugated compounds: Mr. E. Eastwood and Dr. C. P. Snow, "The absorption spectrum of acrolein." Dr. C. B. Allsopp, "The origin of optical exaltation in conjugated hydrocarbons."

There will be a reception by the Lord Provost, the Magistrates and the Town Council of Aberdeen, at the Art Gallery, on Thursday, September 6, at 8.30 p.m.

On Friday, September 7, the Chemistry Section will hold a discussion on ascorbic acid (vitamin C), with contributions by Professor A. Harden, F.R.S., on "History of vitamin C"; Professor A. Szent-Györgyi, on "Isolation of ascorbic acid and its identity with vitamin C"; Dr. E. L. Hirst, F.R.S., on "The chemical properties and structure of ascorbic acid"; Mr. E. Gordon Cox, on "Crystallographic contributions to the study of ascorbic acid"; Dr. T. Reichstein, on "Investigations in the field of ascorbic acid and related substances"; and Professor W. N. Haworth, F.R.S., on "Synthesis of ascorbic acid and its analogues."

A visit to the Fishery Board and D.S.I.R. Laboratories at Torry, has been arranged for Friday, September 7, at 2.30 p.m. On Friday evening a memorial lecture for the late Sir William Hardy, F.R.S., will be delivered by Sir Frank Smith, secretary of the Royal Society, at 8.30 p.m.

On Monday, September 10, the Physics Section and the Chemistry Section will hold a joint discussion on "The physical and chemical properties of heavy hydrogen," with an introduction by Professor E. K. Rideal, F.R.S., and contributions by Dr. A. Farkas on "Some properties of heavy hydrogen"; Mr. H. W. Melville on "Heavy hydrogen; its bearing on problems in chemical kinetics"; Mr. G. B. B. M. Sutherland on "The importance of heavy hydrogen in molecular physics"; Dr. L. Farkas on "Some chemical reactions of heavy hydrogen"; and Mr. C. Strachan on "Adsorpton of gaseous isotopes."

A visit to the Macaulay Institute for Soil Research at Craigiebuckler has been arranged for Monday, September 10, at 2.30 p.m.

On Tuesday, September 11, the Chemistry Section and the Agriculture Section will hold a joint discussion on "The chemistry of milk," with an introduction by Professor H. D. Kay, and contributions by Dr. J. F. Tocher on "The composition of milk and the present regulations," and "Variations in the freezing point of milk"; Dr. W. L. Davies on "Chemical composition of abnormal milk"; Dr. K. Linderstrom-Lang on "Some chemical and physical properties of casein"; Professor T. P. Hilditch on "The composition of milk fat"; and Dr. S. K. Kon on "The vitamins of milk."

The dinner of the Chemistry Section will be held at the Caledonian Hotel on Tuesday, September 11, at 7 p.m. Tickets 8s.

National Physical Laboratory

Papers Published in July

PAPERS published from the National Physical Laboratory during July included the following :—"The determination of a parabolic formula to represent a series of observations," by J. H. Awbery, B.A., B.Sc., F.Inst.P. Published in the "Proceedings of the Physical Society," vol. 46, p. 574; "The mid-course method of fitting a parabolic formula of any order to a set of observations," by T. Smith, M.A., F.Inst.P., F.R.S., published in the "Proceedings of the Physical Society," vol. 46, p. 560; "Some measurements on the electrical characteristics of insulator strings," by W. G. Standring, M.A., published in the "Journal of the Institution of Electrical Engineers," vol. 75, p. 111; "Current research problems in engineering," by H. J. Gough, M.B.E., D.Sc., M.I.Mech.E., F.R.S. Published in the "Proceedings of the Royal Institution," vol. 28, part 2, p. 229; "A connector for wires, particularly for the cold junctions of thermocouple wires," by R. J. M. Payne, B.Sc., published in the "Journal of Scientific Instruments," vol. 11, No. 7, p. 231.

Filling the Vacancy for a Technical Post

By H. Lewis, B.Sc., A.M.I.Chem.E.

CORRESPONDING to the present economic trend, with increase in trade and business optimism, the attention of the industrialist is again focussed on the necessity of increasing his technical staff. Administrative officers will now have the task of choosing a suitable candidate from numerous applicants, and some executives will be meeting this problem for the first time. Only a few firms will possess a personnel management staff or will be able to avail themselves of the advice of a trained industrial psychologist, and the usual procedure is to rely upon the business acumen and a flair for character-reading on the part of one or two of their executives. The individual who does not consider himself a sound judge of human character is indeed rare, but all can increase, however slightly, the accuracy of their judgment by a more systematic and a more definite psychological approach to the problem. However attractive it is to the ego, the idea of possessing mystical abilities in "sizing up people" must be cast aside in favour of attempts to quantitatively evaluate desired traits, if the industrial organisation is to derive the utmost benefit from the choice.

The choosing of an applicant to fill a technical vacancy must, of necessity, be preceded by an analysis of the job requirements, not only in the technical sense but even more so from the psychological viewpoint. The technical qualifications necessary for an analytical, or research works chemist may be similar, such as that signified by the possession of a degree in science, yet the mental characteristics and traits required to fill these positions satisfactorily would be totally different. There may even be character differences required within any one of these three positions, a different temperament being required for organic research than for general industrial research, the former requiring more patience and thoroughness, a desire to know exhaustively, whilst the latter would be more suitable for a man with a broader outlook, a desire for variety, and a certain degree of making quick decisions, although both men would require to have analytic and deductive reasoning faculties.

"Experience Essential"

Still all too frequent is noticed the following type of advertisement:—

> "Young qualified chemist required, experience in '*****' technology essential. Write, stating, etc."

Generally the advertisers get what they request and what they deserve, usually nothing more or nothing less, a person who has had the fortune, or otherwise, of having had some experience in the industry specified, whereas the position could probably have been filled more satisfactorily with a fuller understanding of the job requirements and less emphasis on the experience essential qualification.

The possession of a degree in science may denote several various qualifications, *e.g.*, reasoning ability or mere factual acquisition, but it certainly denotes the ability to assimulate a requisite amount of knowledge regarding any industry within a reasonable time, such as would normally be expected of a technical man "settling down" in a new position. So, undoubtedly, the tendency of old has been to lay too much emphasis on the experience necessary clause. To the author's knowledge, one large company in choosing their potential or actual departmental leaders, especially for their research posts, neglect any previous experience in their industry and favour the engagement of men with experience in entirely different fields.

Various attempts have been made to formulate job valuation scales. Thus Weiss and Downs (1) appropriate the following relative values for technical jobs, including research, development, and engineering:—

Physical qualities	5
Intelligence	30
Leadership	20
Personal qualities	20
General value to the company	25
	100

This can only be considered as a crude scale, since, although research and development may roughly be classified together, both requiring the same type of mind but with different interests, research and works control obviously require fundamentally different characteristics, the quality of leadership being a much more desirable qualification for a works chemist than for a research worker. The estimation of the job requirements will, however, be governed by the company's general policy with regard to the subsequent training of the person. Tyler (2) contrasts the policy of two large petroleum companies. One chooses the applicant for the junior position from the viewpoint of acquiring a potential executive, whereas the other company selects its men primarily on the ability to follow distinctive leadership, but the road to promotion lies equally open in both firms.

Considering letters of application, it must be emphasised that, although they afford good criteria for the judgment of general ability and intelligence, they are usually of very little guide to personal traits, except such as neatness, interest in details, and, perhaps, the rather more important trait of ambition. In general, letters of application for technical posts tend to be scientific data sheets. Incidentally, with regard to written applications, contrary to popular belief, there is little correlation between handwriting characteristics, the so-called graphology, and personal characteristics (3). Usually, copies of references are requested, but these are often not of much value, except as a source of information for the preliminary elimination. A much more reliable standard is the letter of inquiry sent to the previous employers requesting information on the specific items of the job analysis. The interview is the method upon which the employer should rely, and, within reasonable economic limits, as great a number of applicants should be interviewed as possible.

Estimating Qualifications

As mentioned already, attempts should be made to form a quantitative estimate of the applicant's qualifications, and for this purpose a rating blank is used with advantage. A rating blank is a card upon which various characteristics are tabulated, and alongside each characteristic are graded qualifying remarks, the interviewer placing a mark in the space corresponding to his estimated degree in which the applicant possesses the characteristic, an example of a rating card being shown below:—

	Excellent	*Good*	*Medium*	*Poor*	*Weight*	*Score*
Value ..	5	4	3	1	—	—
Approach ..		*			2	8
Tact ..	*				4	20
Ambition ..		*			3	12
Dress, ..			*		3	9
etc. ..						
etc. ..						
					Total Score ..	

Another type of characteristic form is one in which, instead of the divisions being named generically as excellent, good, etc., more specific distinctions appertaining to the trait are listed, thus:—

Approach	Awkward.	Nervous.	Forward.	Well-poised.
Education	Ignorant.	Practical.	Theoretical.	Well-informed.

In this type of card, approach, which would be of importance in technical sales work, is subdivided into "awkward," "nervous," "forward," and "well-poised," and these descriptions are often of immense assistance to interviewers in forming a ready estimate.

It will be seen that the first type of rating card contains a column headed "weight." In this is inserted "weighted" values for the various personal characteristics as previously determined by the job analysis. The score of the applicant for the characteristic is the "value" multiplied by the

"weight." The scoring given in the example obviously refers to a sales representative, but any position can be analysed in a similar manner.

A rating scale gives some quantitative measurement of subjective characteristics, and tends to focus the attention of the interviewers on the more specific requirements, and especially to counteract the influence of stereotypes. Stereotypes are mental pictures of supposed correlations of physical appearances and mental qualities; some of these preconceptions are deeply ingrained, such as a high forehead or stooping shoulders denoting intelligence, and the expression "bull-neck" shows the trend of thought caused by analogy. Scientifically, very little correlation of general physical development, *e.g.*, of the head, can be found with regard to such major character traits as sociability, perserverance, or leadership (4), or any character differences between blondes and brunettes (5). Being unable to free himself entirely from stereotype errors, the interviewer must allow his first impression to be modified during the course of the interview, and in this he is greatly assisted if an attempt is made to evaluate numerically the applicant's qualifications.

Some Necessary Precautions

Several precautions are necessary for a rating scale to be used with advantage, and emphasis must be laid on rating each characteristic without reference to the general impression received during the interview. Two or three raters should independently rate the applicant, the rating being preferably done directly after the interview. Although certain traits may be marked on the rating card during the interview, it is undesirable to make this the procedure as it detracts the attention of the person being interviewed. For a successful interview, it has often been stressed that it is essential to put the applicant at ease, the function of the interviewer being chiefly to listen and to guide the conversation into the desired channels. Too often numerous questions are fired at the applicant, and both likeable and undesirable traits are hidden, due to contact not having been established between the participating parties.

The problem at the interview is to diagnose the applicant's fitness for the job, and attention should be given to two somewhat independent criteria—capabilities and interests. Capabilities are judged not only from the basis of academic qualifications and previous industrial experience, but also from answers to psychologically well-grounded questions. Thus, for instance, in an interview for the position of technical representative for negotiating process licence sales, one applicant was exceptionally well qualified both in chemistry and engineering, but, in the middle of the interview, when he was suddenly asked to state his opinion of the question of protection or free trade, he failed lamentably to give coherent reasons either one way or the other. The object of the question was to estimate tact and the ability to negotiate a sudden emergency of a type similar to that likely to be subsequently encountered; the tariff question being fair subject matter inasmuch as it was the topic of public interest at the time.

Applicants' Interests

Apart from capabilities, it is also of importance to determine interests. An applicant may be fully capable of filling the post but, if his interests do not lie in that direction, his work, although competent, will lack enthusiasm, with a probable consequential adverse influence on the morale of the department. Interests can be determined in several ways, such as by psychological tests or by leading questions.

The psychological tests may perhaps be of the vocational type as carried out by the Institute of Psychology, or of a shorter type similar to that used by the Westinghouse Company in the United States, in which the applicant is asked to mark his preference for ten out of twenty listed occupations, subsequent comparison being made of the choice with statistics already determined from tests made on their own staff, this test distinguishing with good definition between the two main branches of their technical staff, design and sales engineers. This test is based on the fact that interest in a certain class of activities is a criterion that the person will be interested in similar activities. Useful statistics on this type of test have been published by Strong (6).

Mills (7) gives an account of an interesting method of determining interests; considering a career as a means of self-expression, he requests the applicant to list the following media in order of preference :—(a) Ideas, (b) Men, (c) Things, (d) Symbols. Thus, taking limiting cases, a philosopher is concerned with ideas, a politician with men, a machinist with things, and a statistical economist with symbols. Overlapping is bound to occur, *e.g.*, a teacher would express his personality through ideas and men. However, preference is rather definite, and certainly helps to distinguish interests. In one case, a man expressing preference for "men-things-etc." would be suited for a works post, whilst a man suited for a research job would probably list the items in the following order, "ideas-symbols-things-men."

Questions regarding the applicant's sports and social activities also afford valuable confirmatory evidence whether the person is a mixer or an isolationist, but no definite mental picture must be formed from the answer to any specific question, any such answer being taken in conjunction with interest indications determined during the whole interview. Thus, one applicant showed definite individualist tendencies in his sports, played tennis (preferring singles to doubles), played golf, and rowed in singles, also did not play football, cricket, or hockey, whereas references from his previous employers mentioned that he possessed a valuable co-operative spirit. In this case, it appeared that the non-participation in co-operative sports was due to his interest in athletics commencing at a later age than usual.

The various tests made during the interview should be with the object of placing together the jig-saw bits into a complete mental picture of the suitability of the applicant for the position, not with especial emphasis upon some previous experience in a similar job, but, given satisfactory capabilities, more especially from the viewpoint of a temperamental disposition indicating ambition, good morale, and similar interests ensuring enthusiasm and permanency.

(1) Weiss and Downs, "The Technical Organisation." (1924.)
(2) Tyler, "Chemical Engineering Economics." (1926.)
(3) Hull and Montgomery, "Psychological Review" (1919), **26,** 66.
(4) Sheldon, "Personnel Journal" (1927), **6,** 102.
(5) Paterson and Ludgate, "Journal of Personnel Research", (1922), **1,** 122.
(6) Strong, "Personnel Journal" (1929), **7,** 442.
(7) Mills, "Journal of Personnel Research" (1924), **3,** 198.

Accidents at Chemical Works

Statistics for 1933 from the United States

FREQUENCY rates in chemical plants of the United States in 1933 averaged 2 per cent. higher than in 1932—the first rise since 1926—but severity rate was 10 per cent. below the previous year, according to a survey recently completed by the National Safety Council. These changes are based on the records of 232 companies reporting both years.

The frequency rate is the number of disabling injuries per 1,000,000 man-hours of exposure; the severity rate is the number of days lost as the result of disabling injuries, per 1,000 man-hours of exposure. A disabling injury is a term applied to any injury arising out of and in the course of employment that results in death, permanent total disability, permanent partial disability or temporary disability. The 1933 frequency of 10.46 for the chemical industry is lower than the rates for steel, food and automobile plants but slightly higher than for machinery manufacture. On the contrary, however, these industries, with the exception of steel, have lower severity rates than chemical plants. All American industries averaged 14.56 for frequency and 1.59 for severity. The 1932-33 changes in injury rates for the chemical industry compare favourably with results in other groups. The rise of 2 per cent. in frequency is considerably less than in other industries, and, with the exception of machinery, chemical plants did much better in severity than the other groups.

As in 1932, large plants had better records than small organisations in frequency but in severity the advantage lies with the small units. The 1933 experience of small plants, in fact, makes a much more favourable comparison than was the case a year ago.

The Imperial Institute

Its Work in Developing the Empire's Raw Materials

IN presenting his annual report on the work of the Imperial Institute for 1933, Lieut.-Gen. Sir William Furse, the director, points out that the Institute is not sufficiently known. It has been left, overmuch, to carry on as best it can. It has never been financed adequately and systematically as an acknowledged and necessary department entrusted with responsible duties for each and every part of the Empire.

From time to time an outside committee has been appointed to investigate the Imperial Institute and to make recommendations. The occasion, more often than not, has been due to threatened bankruptcy. Its own resources, drawn from its original endowment and from chance lettings of rooms, amount to less than 10,000 per annum. The income really needed is more like four or five times that figure. As its services are largely Imperial rather than National and as there is no single Imperial Exchequer or Parliament to vote the necessary additional funds, constitutional questions have, no doubt, presented special difficulties. The fact remains that whereas for all other Government services, both at home and overseas, it is recognised that adequate maintenance grants must be voted from year to year, this is not the case with the Imperial Institute. As the Board of Governors is well aware, the Institute has only been kept alive for the past ten years by munificent gifts from private individuals. In no spirit of ingratitude to these gentlemen, Sir William therefore ventures to suggest that this method of carrying on our essential Imperial service is unworthy of the British Empire.

Oils and Oilseeds

The experimental cultivation trials with tung trees, initiated by the Sub-Committee on Tung Oil, have been continued in many parts of the Empire and reports have been received on the progress made. Further samples of tung fruits and nuts produced in these trials have been examined and the results have again shown that tung oil equal in quality to the best Chinese and American oil can be produced in the Empire. In connection with the work of the sub-committee, feeding trials which had been undertaken at the Rowett Research Institute, Aberdeen, with the residual meal left after the extraction of the oil from tung seeds, have shown that the meal is unpalatable to animals and also contains some irritant constituent. It is, therefore, unsuitable for use as a feeding-stuff and can only be utilised as a manure.

Tests carried out at the Paint Research Station have shown that the oil of *Aleurites montana*, although somewhat inferior to the oil of *A. Fordii* as judged by the specification tests, nevertheless compares favourably with the latter oil when used for varnish-making. This result is important as it is probable that *A. montana* will be more successful in tropical countries than *A. Fordii*. In connection with the provision of machinery for de-husking tung fruits and decorticating the seeds, fruits have been purchased from the United States for distribution to various British firms who have expressed a desire to experiment with a view to perfecting their existing machines. A further supply of fruits has also been obtained for experimental purposes in connection with the elucidation of problems relating to the production of the oil by crushing and extraction.

Essential Oils and Resins

As the result of the recommendations made by the sub-committee on Indian Lac regarding the action which should be taken to improve the present demand for lac and to enable it to meet the increasing competition of artificial resins, a scheme of research to be carried out in the United Kingdom was approved by the Indian Lac Cess Committee and sanctioned by the Government of India. The scheme was inaugurated during the year and is now in full operation. Three Indian workers with high academic qualifications and research experience are investigating the application of lac products in the varnish and moulding industries and the use of lac in the electrical insulation and allied industries at institutions in this country. As also advocated by the sub-committee, contact is being maintained with research work on lac carried out in other countries. In view of this satisfactory development the High Commissioner for India has appointed an Advisory Committee on Lac and Shellac Research, under his chairmanship, to supervise the work. The Imperial Institute Sub-Committee on Indian Lac, having completed its work, has accordingly been dissolved.

Animal and Plant Products

The Investigations Section of the Plant and Animal Products Department is concerned with the chemical and technical examination of Empire raw materials, in order to determine their suitability for use in industry or commerce. This work is carried out in consultation with the Advisory Council and its Technical Committees, and close touch is maintained with manufacturers and users of raw materials and with merchants, brokers and technical and commercial organisations. During 1933 reports were furnished on 689 samples. The samples were submitted chiefly by Agricultural and Forestry Departments overseas and by High Commissioners and other representatives of Empire Governments in London. Samples were also received from the Department of Overseas Trade, the Colonial Office, the Empire Marketing Board, the Empire Cotton Growing Corporation, and the Imperial College of Tropical Agriculture, Trinidad.

During the year investigations were carried out on Agave fibre, raffia and kapok from Tanganyika; Piassava from Sierra Leone; Hibiscus fibre, Sisal rope and Akund floss from India; Asclepias and Calotropis flosses from Uganda. The paper-making materials examined included samples of bamboo and sisal pulp from Kenya, mangrove wood from the Gambia, Jarrah bark from Western Australia, and Sisal refuse from Tanganyika.

Reports were furnished on fifty samples of essential oils from various parts of the Empire, including the following: Lavender oil from South Africa; geranium oils from Ceylon, Kenya and Tanganyika; patchouli oil from Seychelles; peppermint oils from Cyprus and Kenya; vetiver oil from Uganda; Muhugu (*Brachylæna*) oil from Kenya; Mlanje cedar-wood oil from Nyasaland; spearmint oil from the Sudan; citronella and lemongrass oils from Seychelles; lemon-grass oil from Tanganyika; eucalyptus oil from Australia; lime oils from Ceylon and Dominica; oil of *Pimenta* sp. from Dominica: nutmeg and mace oils from Grenada.

Gums and Resins

Ninety-four samples of gums and resins were dealt with during the year, including a collection of seventy-six samples forwarded by the Forestry Department in Nigeria as representing the common gums and resins occurring in the Northern Provinces. Other samples received were: Mukwa resin (*Pterocarpus* sp.) from Southern Rhodesia; Crown gum (*Achras* sp.) and Protium oleo-resin from British Honduras; lac from Malaya; *Boswellia* oleo-resin from India; and *Commiphora* (*Balsamodendron*) resin from South Africa. The samples received from Nigeria included specimens of soluble Acacia gums representing the best qualities now being produced in Bornu and Yola Provinces. These were of good quality, comparing favourably with Sudan gums except that they were generally of rather darker colour. Consignments of similar character to the samples would be readily and regularly saleable in London.

The oils and oilseeds investigated included ground-nuts from Uganda, Sudan and Nigeria; sunflower seed from Cyprus, Sudan and South Africa; Po-yok fruits and kernels from Sierra Leone; Sterculia fruits from the Gold Coast; shea nuts from Nigeria; tung fruits and nuts from Kenya, Nyasaland, Southern Rhodesia, South Africa and New Zealand; *Aleurites montana* oil from Ceylon; soya beans from Nyasaland and South Africa; sesame seed from the Sudan; and Lophira and Balanites fruits from Uganda. In

addition a number of commercial samples of Samoan copra were analysed for the New Zealand Government. The number of samples of oils and oilseeds involved in these investigations was 100. Among the most important inquiries were those relating to a series of 26 samples of shea nuts from Nigeria and to 10 samples of tung fruits and nuts from several countries.

Marketing of Beeswax

An inquiry came from the same country, where a firm are considering the collection and export of beeswax, and desired information as to the feasibility of marketing the product in this country. They were supplied with a memorandum dealing with the conditions for marketing beeswax to the best advantage, and with information, obtained from firms interested in the commodity, regarding the market in the United Kingdom for beeswax and with particulars of ruling prices. An account of the processes employed for cleaning and clarifying the product was given together with particulars of a firm in this country able to supply equipment suitable for the purpose.

Attempts were being made by the Veterinary Department in Northern Nigeria to develop an export trade in ghee (clarified butter) and, following observations as regards methods of improving the product from that region, particulars were furnished of modern plant for preparing ghee and of machinery for making cans for packing it. As an alternative to the latter the use of "flattened" cans was suggested, and details were supplied of the special machines for re-shaping the cans for use. Suggestions were offered in connection with the "decorating" of the cans, and sample cans were sent to Nigeria to assist in deciding on the question of sizes to be used.

A firm of chemical engineers who had received an order to supply plant for the preparation of the alkaloids from cinchona bark desired information to enable them to design the equipment necessary. They were supplied with an outline of the process usually adopted for extracting cinchona alkaloids and were referred to publications containing full information on the subject. Observations were made with regard to the form in which the bark is shipped (in "quills") and the names of firms who could supply information as to the weights of bales of bark, which vary according to the country of origin, were given.

Mineral Resources

The chemical and mineralogical laboratories, which include sections for conducting assays, brick, tile and pottery investigations and cement-testing, continued to carry out analyses, technical trials, etc., as well as commercial valuations, of samples sent from many parts of the Empire. Reports were made on 113 investigations, the number of samples examined being 443.

The sender of one batch of materials was interested in the marketing of ilmenite and zircon which occur in quantity on some properties under his control. The samples consisted of ilmenite and zircon sands, and also of crude zircon sand containing ilmenite. The former were found to be of marketable quality, and the latter would be saleable after being purified by electro-magnetic means. The inquirer, who also asked regarding a market for the separated minerals, was put into touch with brokers and consumers in the United Kingdom, and also with chemical manufacturers in Czechoslovakia who wished to obtain supplies.

Ten samples of clay, obtained by the Minister for Labour and Commerce, Ceylon, on behalf of the Ceylon Government pottery instructress, by whom they were forwarded to the Imperial Institute, were found to be unsuitable for use in the raw state for ceramic purposes on account of their high percentages of sand and mica. On washing, however, clays were obtained which might be suitable for making terra-cotta and white ware.

Samples of bat guanos were sent by the Agricultural Officer, British Honduras, in order to ascertain whether the material was worth using for field trials in the Colony. Analyses made at the Institute showed that both the samples, of which large quantities were stated to be available, were inferior to good quality commercial guanos. One sample, however, which contained satisfactory amounts of phosphoric acid, lime and potash appeared worth practical field trials. It was suggested to the sender that the better quality guano could roughly be distinguished from the poorer by the difference in colour.

A sample of white silica sand from a pit in Sussex was forwarded through the Department of Overseas Trade for examination in order that suggestions might be made regarding possible markets. Mechanical and partial chemical analyses were made, and showed that the sand would be suitable, as regards its grading, for glass manufacture, but that it contained rather too high a percentage of ferric oxide for making glass of the best quality. The senders were put in touch with a number of glass-bottle makers, one of whom inspected the deposit and carried out tests with the material.

The results of preliminary tests on bentonites from Leeward Islands and commercial valuations showed that these materials, which had been sent by the Colonial Secretary, Leeward Islands, could not be successfully marketed in competition with high-grade bentonite available from other sources. One of the samples was of a very calcareous nature and, when burnt, gave a product having hydraulic properties.

The Intelligence section of the Mineral Resources Department is responsible for the collection and dissemination of information concerning mineral resources in general and those of the Empire in particular. It supplies information mainly of a technical and commercial character not only to Government Departments, but also to firms and private individuals both in the United Kingdom and overseas, and for this purpose maintains a technical index containing references to mineral resources, geology, chemistry, mining, utilisation, marketing, etc.

Export of Canadian Gypsum

In connection with an inquiry relating to the possibility of exporting Canadian gypsum to the United Kingdom, the Canadian Government Trade Commissioner in London was given information regarding the consumption of gypsum by cement works situated on navigable waters in the United Kingdom, an average analysis of the gypsum imported from France for use in cement manufacture, and the amount of gypsum added to cement clinker during manufacture.

The possibility of marketing Kenya diatomite was raised by H.M. Eastern African Dependencies Trade and Information Office in London, to whom information was supplied regarding methods of preparing and shipping the mineral together with the names of dealers likely to purchase it. Similar information was also supplied to a private resident in Kenya, who subsequently sent samples to the Institute for technical trial and valuation. The possibility of marketing Queensland diatomite in London was raised by an inquirer on behalf of the Australian producers, and, as the material appeared promising, he was recommended to submit samples to certain London brokers. Information was also given as to how the material should be shipped.

An inquirer wished to find a market for dead-burnt magnesite produced from material occurring in the Anglo-Egyptian Sudan. He was given information regarding importers and dealers in the United Kingdom and the import trade in dead-burnt magnesite from Austria and Greece. The Government Geologist in Kenya asked for suggestions as to a possible outlet for the ilmenite which might be recovered during the operations of dredging for gold. General information was given to him, and he was asked to send to the Institute samples of the ilmenite when it becomes available, so that tests could be made and the market possibilities ascertained.

These instances are merely cited to give some indication of the work of the intelligence section.

WITH the sanction of the Secretary of State for India, it has been decided to transfer the Imperial Agricultural Research Institute from Pusa to Delhi. It will be remembered that the Pusa Institute buildings were recently demaged by earthquake, and it was ascertained that not less than Rs.10 lakhs would be required to effect the necessary repairs. It is now considered that the transfer of the Institute to a better locality would be more useful and economical. In Delhi the Institute will be in close contact with provincial experts who visit Delhi from time to time, and also with the Imperial Council of Agricultural Research.

A Survey of the Import Trade of India

Chemical Trade Practically Stationary

A SURVEY of the import trade of India for the fiscal year ended March 31, 1934, prepared by the senior British Trade Commissioner in India, has been issued by the Department of Overseas Trade. Attached to the report is an extract from the Ceylon Administrative Report (Customs and Shipping) for 1933.

During the twelve months ended March 31, the value of imports into India decreased, as compared with the corresponding period of 1933, by Rs.17 crores* or 13 per cent. and amounted to Rs.115 crores and the total exports, including re-exports, rose by Rs.14 crores or 10 per cent. to Rs.150 crores. The exports of Indian merchandise showed an increase of Rs.14 crores or 10 per cent. and the re-exports also showed an increase of Rs.20 lakhs or 6 per cent. The grand total of imports, exports and re-exports amounted to Rs.265 crores as against Rs.268 crores, a decrease of Rs.3 crores or 1 per cent.

Ottawa Agreements

In the survey for the year 1932-33 it was pointed out that the continuous decline in the share of the United Kingdom in the import trade of India had at last been checked and an advance was recorded from 35.4 to 36.8 per cent. This steady process of regaining lost ground proceeded during 1933-34. Notwithstanding a reduction in the total imports of over Rs.17 crores, resulting from a continuance of the depression which pervaded the Indian market, the imports from the United Kingdom only fell by Rs.1.2 crores and her share of the total import trade rose from 36.8 to 41.2 per cent. This most satisfactory improvement in the relative position of the United Kingdom in the trade of her most important export market was accomplished in spite of a reduction of Rs.3½ crores in the imports of British piecegoods. Where Ottawa preferences have operated, the United Kingdom relative position has been improved and, in many cases, shipments of United Kingdom goods have actually increased in face of a greatly reduced trade. Lubricating oils (Rs.26 lakhs in 1933 against Rs.21 lakhs in 1932) and paints (Rs.46½ lakhs against Rs.43 lakhs) are typical items where the influence of the Ottawa Trade Agreement is noticeable. Under many other headings where preference is accorded, the relative position of United Kingdom goods has been improved notwithstanding a material decline in the total trade. In items where preference is not granted, mention should be made of an increase in the imports of British sugar machinery from Rs.91¼ lakhs to Rs.196 lakhs.

Paints and Colours

The total trade in paints and colours rose from 340,449 cwt. valued at Rs.70¼ lakhs to 369,815 cwt. also valued at Rs.70¼ lakhs. The share of the United Kingdom advanced from 160,652 cwt. (Rs.43¼ lakhs) to 179,417 cwt. (Rs.46¾ lakhs), Imports from Germany rose in quantity from 40,077 cwt. to 49,450 cwt. but fell in value from Rs.9 lakhs to Rs.7½ lakhs. Arrivals from Japan fell from 56,977 cwt. (Rs.7¼ lakhs) to 46,576 cwt. (Rs.6¼ lakhs).

A further fall is recoided in the total soap trade from 296,341 cwt. valued at Rs.82½ lakhs to 303,413 cwt. valued at Rs.78½ lakhs. The United Kingdom share fell from 248,063 cwt. (Rs.69½ lakhs) to 234,210 cwt. (Rs. 63½ lakhs), while that of "other countries" advanced from 48,278 cwt. (Rs.13 lakhs) to 69,203 cwt. (Rs.14¾ lakhs). The imports of soap were divided as follows: Household and laundry soap 244,874 cwt. (Rs.44½ lakhs); toilet soap 52,016 cwt. (Rs.32 lakhs); other sorts 6,523 cwt. (Rs.2 lakhs); total 303,413 cwt. (Rs.78½ lakhs).

Chemical Imports

Once again it is satisfactory to record that, notwithstanding the severe depression and reduced purchasng power, the total imports of chemicals remained practically stationary at Rs.270 lakhs. No details are available of the countries of origin but the following table gives particulars of the total imports under each of the principal headings :—

	1932-33. *Rs. (lakhs).*	1933-34. *Rs. (lakhs).*
Acids	7¾	8
Bleaching powder	9½	9
Carbide of calcium	7¼	6½
Copper sulphate	3	3½
Disinfectants	7	7
Glycerine	3	3¾
Potassium chlorate	11¼	12
Sodium bicarbonate	8	8½
,, carbonate	64¾	64
,, cyanide	3¼	2¾
Caustic soda	34	35½
Sodium silicate	2	2½
Sulphur (brimstone)	19½	20½

Total imports of drugs and medicines advanced from Rs.186 lakhs to Rs.193½ lakhs due to increased imports of quinine salts and miscellaneous drugs. Details of the countries of origin are not yet avaiable but the following represent the total imports in each of the principal items :—

	1932-33. *Rs. (lakhs).*	1933-34. *Rs. (lakhs).*
Camphor	25¼	23
Proprietary and patent medicines	37¾	31
Quinine salts	26¼	31¾
Saccharine	2¼	2½

Coal Tar Dyestuffs

Total imports of dyes obtained from coal tar show a further decline from Rs.217 lakhs to Rs.211 lakhs. Details of the countries of origin are not yet available but the following figures show the total imports from all sources under each main heading: *Alizarine—Moist*—(i) Not exceeding 16 per cent. Rs.2 lakhs (against Rs.2 lakhs in 1932-33); (ii) over 16 per cent. but not exceeding 20 per cent. Rs.13½ lakhs (against Rs.11¼ lakhs in 1932-33); (iii) exceeding 20 per cent. Rs.4½ lakhs (against Rs.4 lakhs in 1932-33); *Congo red* Rs.7½ lakhs (against Rs. 11¼ lakhs in 1932-33); *Coupling dyes of the naphthol group*—(i) Naphthols, rapid fast colours (rapid salts) and bases Rs.29½ lakhs (against Rs.30 lakhs in 1932-33); (ii) other salts Rs.8¾ lakhs (against Rs.10¾ lakhs in 1932-33); *Vat dyes*—(i) Indigo Rs.16¼ lakhs (against Rs.15½ lakhs in 1932-33); (ii) other sorts—(*a*) paste Rs.4½ lakhs (against Rs.8 lakhs in 1932-33); (*b*) powder Rs.46½ lakhs (against Rs.39½ lakhs in 1932-33); *Sulphur black* Rs.13 lakhs (against Rs.11¼ lakhs in 1932-33); *Metanil yellow* Rs.4 lakhs (against Rs.4 in 1932-33). Of the import of nearly 14 million lb. no less than 10 million lb. were imported via Bombay, 1½ million lb. via Madras, over 1 million via Karachi and just under 1 million via Calcutta.

The total trade in glass and glassware declined from Rs.142½ lakhs to Rs.122 lakhs. Imports from the United Kingdom fell from Rs.12 lakhs to Rs.11 lakhs, those from Germany from Rs.17¾ lakhs to Rs.13½ lakhs, Belgium from Rs.15 lakhs to Rs.10¾ lakhs, Czechoslovakia from Rs.23 lakhs to Rs.20 lakhs and Japan from Rs.65½ lakhs to Rs.57 lakhs.

Conditions in Ceylon

The extract from the Ceylon Administration Report on the Customs and Shipping for 1933 states that the value of the total trade of Ceylon in 1933, excluding specie, was Rs.377,490,773, a decrease of over 7½ million rupees as compared with 1932, and the lowest figure recorded since 1912. Although there was a decline of nearly 20 million rupees in the value of imports as compared with 1932 there was an appreciable increase in the value of exports which rose from Rs.188,837,000 to Rs.200,193,000, an increase of Rs.11,356,000, of which Rs.10,348,000 was in respect of tea.

During the latter part of the year, the value of two of the major products, viz., tea and rubber, showed an improve-

* Rupees one lakh (Rs. 1,00,000)=£7,500 @ 1/6 exchange. Rupees one crore=Rs. 100 lakhs=£750,000.

ment, while the value of coconut produce declined still further, the price of some of the chief coconut products, which remained fairly steady during the early part of the year, having dropped nearly 40 per cent. by December. The quantity of coconut products and rubber exported increased by 18 per cent. and 26 per cent. respectively, but tea dropped by 14 per cent. in consequence of the restricted exportable quota.

The balance of the total trade of Ceylon has shown an excess of exports since 1901, with the exception of the two years 1920 and 1932. The highest export balance ever recorded was Rs.1,619 lakhs in 1925, which gradually dwindled in the ensuing years to 89 lakhs in 1930. This figure improved slightly to Rs.194 lakhs in 1931 but in the following year it changed to an import balance of Rs.73 lakhs.

This was the second time since the year 1901 that an excess of imports had been recorded, the last being Rs.452 lakhs in 1920.

The following statement gives a comparative analysis of the country of origin of certain selected imports for 1932 and 1933:—

	United Kingdom.		British Possessions.		British Empire.		Foreign Countries.	
	1932. Per cent.	1933. Per cent.	1932. Per cent.	1933. Per cent.	1932. Per cent.	1933. Per cent.	1932. Per cent.	1933. Per cent.
Lubricating oil ..	15	43	—	—	15	43	85	57
Perfumery (other than perfumed spirits) ..	59	50	6	6	65	56	35	44
Photographic materials	64	59	—	9	64	68	36	32
Chemicals and disinfectants	61	56	14	28	75	74	25	26

Although it is too early yet to estimate the effect of preferences accorded by Ceylon, the figures give a fair indication of the general improvement in trade with Empire countries. It will be noted that in the case of lubricating oil importations from the United Kingdom showed considerable increases at the expense of foreign countries, and that a similar changeover in trade is noticeable under the head of photographic materials. The advance of foreign countries in respect of perfumery (other than perfumed spirits) is due to the fact that American competition has been more insistent in the year under review than in 1932.

The Institution of Petroleum Technologists

Progress of Cracking in 1933

THE progress of the art of cracking in 1933 was the subject of an important paper presented at the recent summer meeting of the Institution of Petroleum Technologists, in London, by Dr. Gustav Egloff, Ph.D., M.Am.Inst.Chem.E., M.Am.Chem.Soc., and Badona L. Levinson, who pointed out that advance has been marked in many directions. The tendency has been more and more toward careful fundamental research into the basic factors involved in the cracking reaction in order to improve operating results. Cracked products are being evaluated to an ever-increasing extent according to quality rather than quantity, *e.g.*, higher octane value rather than yield of gasoline. For that reason the ratio of cracked to straight-run motor fuel steadily increases, in the United States and in foreign countries as well. National policies in numerous countries are also aiding the expansion of cracking facilities by fostering their own refining industries and discouraging importation of finished products.

Multiple Coil Cracking

It is increasingly notable, said the authors, that the modern refinery tends to centre about the cracking unit as its most vital part. Moreover, there is a greater realisation of the outstanding need for suitable materials to build equipment which will withstand the increasingly severe operating conditions of cracking. Materials for high pressure, high temperature equipment are being constantly studied and developed. A noteworthy tendency in commercial cracking plants is directed toward multiple coil cracking, so that each fraction of the charge is treated under its own optimum conditions. So-called by-products of the cracking process have increased in number and importance to such an extent that cracking conditions are sometimes regulated to produce other products than gasoline. Alcohols from cracked gases and gasoline, and asphalts from cracked residues are outstanding examples.

Some exceptionally interesting trends in the relation between cracked and straight-run gasoline are to be noted in 1933. During the month of November the amount of cracked gasoline produced actually exceeded the straight-run —15,393,000 barrels to 14,708,000 barrels—so that straight-run gasoline represented only 45 per cent. of the total gasoline output for the month, while cracked gasoline was 46.8 per cent.

The use of catalysis in the liquid-vapour phase cracking of mineral oil has increased in the past year. Yields of 48 per cent. gasoline boiling at 50-200°, a 15 per cent. fraction boiling at 200-300°, and 18 per cent. above 300°, were reported from the cracking of Emba crude oil at atmospheric pressure with 10 per cent. aluminium chloride. Grozny paraffin, cracked at 130-140° in contact with finely ground aluminium chloride, yielded 55 per cent. gasoline, 25 per cent. asphalt and 20 per cent gaseous products.

Two installations of non-catalytic vapour-phase cracking units are reported to be in progress. One, at Tampico, is designed to produce 1,000 to 1,500 brls. per day of finished gasoline. Another, in Louisiana, involves the construction of two units processing reduced crude. The use of catalysis in connection with vapour-phase cracking of petroleum oils to obtain high anti-knock gasoline is the theme of a recent description of what is known as the "Houdry process." The advantages of this process, which is in the experimental stage, are claimed to be (1) higher octane gasoline; (2) lower production cost; (3) a residual oil that is always a clean stock of gas-oil boiling range; and (4) use of moderate temperatures and pressures only slightly above atmospheric.

In spite of the original domination of gasoline as the primary important product from cracking, the number and importance of the so-called by-products of the process have grown to undeniably great proportions. In many cases these products have ceased to be by-products at all, but have become the end toward which the conditions of cracking are regulated. Alcohols of many kinds are available from cracked petroleum hydrocarbons. A specific example of the development of alcohol synthesis from cracked products, as reported by a large chemical company, was based on the desire to utilise fully the large quantities of ethylene made at relatively low cost in the hydrocarbon cracking processes being operated by that company. The polymerisation of olefins, of which a high percentage is contained in cracked gases, to produce liquid fuels has been applied in several directions. Gasoline may be the product, lubricating oils may be formed, or special fuels such as Diesel oil may be obtained.

Special Products

Dealing with "Special Products," Dr. S. F. Birch, Ph.D., B.Sc., A.I.C., D.I.C., said there was nothing particularly outstanding to report for 1933. Useful work is still continuing in the development of synthetic solvents, etc., from refinery gases, particularly higher alcohols and ketones, and some of the latter, which have been both difficult and expensive to prepare, are now available in commercial quantities for the first time. The direct oxidation of methane and ethane has indicated the possibility of almost unlimited new sources of the corresponding alcohols and acids, while supplying, incidentally, definite proof of Bone's hydroxylation theory of oxidation.

Cork Dust Explosion

Recommendations Against Further Disasters

THE inquest on the four victims of fire at Washington Chemical Works, County Durham, concluded at Newcastle, on August 3, when the jury returned a verdict that the men died from the injuries described by the doctor at the opening of the inquiry. They were of opinion "that the explosion (during the fire) was due to a draught of air being created upwards through the bin, forming an explosive mixture with the gas evolving from the cork, and being ignited by the smouldering mass," but attached no blame to the workmen, as they were only adopting methods previously used.

Mr. G. Stirling Newall, joint managing director of Turner and Newall, owners of the works, assured the coroner and the jury that they would do all in their power to help the relatives of those who died, and to assist those who were still suffering, and their wives and children.

The recommendations made by Mr. John S. F. Guard, the works chemist, on precautionary measures against further disasters, were mentioned by the coroner (Sir Alfred Appleby), as follows:—(1) The further and more complete isolation of the plant. (2) The bins to be arranged with open tops, similar to Dutch barns, fitted with cowls and ventilators. This would tend to change the air slowly above the cork level, keeping it free from combustible gas or dust. (3) A series of thermo-couples at intervals to be carried in a light metal tube running the full length of the bin beneath the cork level, and coupled in parallel through a common point outside the bin to an indicating or, preferably, a recording instrument. This would quickly indicate any local temperature rise in the bin caused by the presence of a patch of smouldering cork, instead of being dependent on the observation of issuing smoke or heating of the bin sides. (4) The bin sides should be fitted with a system of hand-operated drenchers, working on low pressure, to avoid disturbance of the smouldering mass. The drenchers would be operated by an attendant when the thermo-couples indicated an increase of temperature in the bin above an agreed maximum.

German Superphosphate Industry

Further Production Capacity Prohibited

BY a decree dated May 29, 1934, the Reich Minister of Economy has forbidden the establishment of new, or expansion of production facilities of existing, superphosphate factories, until December 31, 1936. The grounds for the prohibition are that the already over-built condition of the superphosphate industry would render any further increase in production capacity a malinvestment of capital. The Government's action in finally prohibiting any further increase in superphosphate production capacity follows increasingly insistent demands of German superphosphate producers caused by the already great excess of capacity over consumption demand, threats of the construction of some new large plants, and particularly the unfavourable course of output this year caused by a notable increase in imports of superphosphate consequent upon a reciprocal trade agreement with the Netherlands and the greatly increased consumption of basic phosphate slag, narrowing the total market demand for both domestic and foreign superphosphate.

Last year the German superphosphate industry was greatly disturbed by the plans for constructing a new large superphosphate plant in Gleiwitz, Upper Silesia, independently of the German Superphosphate Syndicate, embracing all the thirty plants comprising the German industry. These plans involved considerable difficulties with the Syndicate which were finally settled by the Kokswerke and Chemische Fabriken A.G. agreeing to drop the new plant project in return for the Syndicate's granting a larger production quota to a subsidiary superphosphate concern already a member of the Syndicate, namely, the Superphosphatfabrik Karl Koethen G.m.b.H.

In recent months the industry has been exercised over the reported plans of the "Bergwerks A.G. Georg von Giesches Erben" to erect a large superphosphate factory in conjunction with the huge 40,000 ton capacity electrolytic zinc smelter now in course of construction at Magdeburg, in Central Germany, and to start operations shortly, utilising the plant's abundant output of sulphuric acid for superphosphate manufacture. Superphosphate manufacturers have been especially critical regarding this plan as the zinc smelter referred to is being financed by the Government and it is charged that the Government itself would thus be responsible for further aggravating the superphosphate industry's already unfavourable condition.

Chemical Fertiliser Consumption

An Analysis of World Statistics

CONSUMPTION of chemical fertilisers throughout the world fell to a record low level for recent years in 1932. The sharp recovery which occurred during 1933 placed the total volume of chemical fertilisers applied to the world's arable land in excess of the average consumption for the 5-year period 1924-1928.

Notwithstanding incomplete data, it is possible to make some comparisons of the trend in consumption in 1933 with the 5-year average for 1924-1928. Of the three chemical elements considered in the purchase of fertiliser—nitrogen, phosphorus and potassium—nitrogen alone showed a gain. Potassium was about unchanged and phosphorus registered a decline. Index figures for world consumption of inorganic fertilisers are given below:—

	Average for 5 years ended 1928	1929	1930	1931	1932	1933
Nitrogen (agricultural consumption)	100	145	152	126	122	139
Potash (K_2O) consumption ..	100	128	126	92	84	98
Phosphoric acid (P_2O_5) consumption as phosphate rock and basic slag	100	118	112	76	71	86

The gain recorded in total world nitrogen consumption can hardly be considered a gain to those who contributed the nitrogen used in 1924-1928, much of the 1933 consumption having originated in establishments not in production during 1928 or earlier. As in the case of nitrogen, the old-established potash producers have felt the competition of newcomers. Sources of phosphate supply have been subject to only one major change, namely, the tapping of the Khibiny (Russia) apatite resources. Russia, a former importer of small quantities of phosphate rock, furnished almost 9 per cent. of the world total in 1933, ranking fourth in world production, a place held in recent years by Algeria.

Chemical fertiliser tonnage consumed in the United States in 1933 shrank to two-thirds of the 7,200,000-ton average recorded for 1924-1928. European consumption has followed a fairly even course, a loss in phosphoric acid consumption being offset by a gain in nitrogen. There has been a spectacular rise in Japan's consumption of nitrogen.

Polish Chemical Industry

Export Trade Improves

IMPORTS of chemicals and allied products during the first four months of 1934, amounting to 14,700,000 zlotys ($2,700,000), and exports, amounting to 13,100,000 zlotys ($2,400,000) were considerably above the unusually low figures for the corresponding period of 1933. For the entire year 1933, however, the total chemical trade held up better than in most countries, with decreases of only about two per cent. from the 1932 figure; but compared with 1931, imports were only half as much, although exports were only a little less. Nine countries supplied 81 per cent. of the import trade in 1933. Germany, accounting for 40 per cent., furnished far more than its nearest competitor, France; other leading sources were Belgium, United Kingdom, Netherlands, Czechoslovakia, Austria, United States, and Russia. Germany, likewise, took more of Polish chemicals than did any other country, or approximately one-half of the total exports; other countries receiving Polish chemicals were, Czechoslovakia, Sweden, Belgium, Netherlands, and Austria, though exports are shipped to many foreign countries.

Continental Chemical Notes

DECOMPOSITION OF CARBON SUBOXIDE in the gaseous form is reported ("Chem.-Zeitung," August 1) to result in formation of carmine-coloured gaseous carbon.

* * *

A NEW TURPENTINE FACTORY has been erected by the Loskit concern at Dorpat, in Esthonia, with the object of producing oil of turpentine and rosin for export as well as for home consumption.

* * *

CARBON BLACK MANUFACTURE was recently commenced by a Hungarian firm who utilise the process of the Rumanian Ploesti Works which is based upon a by-product of the petroleum refineries.

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CRESOL-SULPHURIC ACID in 3 per cent. concentration is a satisfactory disinfectant for murrain-infected cattle trucks, according to recent investigations of R. Helm ("Chem.-Zeitung," August 1).

* * *

A NEW INDUSTRIAL DEPILATORY PROCESS for recovering animal hair in good condition is to be exploited by the recently formed Gerbehemie-Gesellschaft of Essen. Good results are stated to have already followed large-scale application of the process.

A GERMAN GOVERNMENT DECREE prohibits the erection of new plant or the extension of existing plant in connection with manufacture of lead, zinc, and numerous other pigments.

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OUT OF AN ESTIMATED WORLD PRODUCTION of 10,000 tons of citric acid, no less than 7,700 tons is made by the fermentation process. The principal exporting countries are Czecho-Slovakia, Italy and Belgium, whilst the greater part of the British and United States output is absorbed by the home market.

* * *

THE I.G. FARBENINDUSTRIE, in its report for the second quarter of 1934, mentions the strenuous efforts to maintain its foreign trade in the face of all difficulties. These efforts were not attended with success in all departments. The trade in pharmaceuticals with several European countries underwent some improvement, but photographic chemicals export turnover declined. Continued decline was recorded in the quantity of artificial fertilisers exported. The dyestuffs trade was unchanged. Benzine output increased with the progressive extension of the Leuna hydrogenation works. Progress was also achieved in both the inland and export trade in viscose, acetate and cuprammonium rayon.

Annual Meeting of Benn Brothers, Ltd.

Sir Ernest Benn Forecasts an Upward Movement

SIR ERNEST BENN presided at the annual general meeting of Benn Brothers, Ltd., at Bouverie House, Fleet Street, on August 3. In moving the adoption of the report and accounts and the payment of dividends of 3 per cent. on the preference shares, making 6 per cent. for the year, 10 per cent. on the ordinary shares, making 15 per cent. for the year, and 2s. per share on the deferred shares, making 3s. per share for the year, he paid a tribute to Sir Robert Welsford, solicitor to the company for many years, who had died since the last annual meeting. He also referred to the Silver Jubilee year of the King, which he thought was going to be a bright one for trade and industry.

The past year had seen some rapid developments in the personnel of the directorate. Sir Ernest himself had succeeded to the chairmanship of the United Kingdom Provident Institution, and that had involved the passing over of some of his responsibilities to some of his colleagues. It had put a great deal of strain on the seniors among them, but it was proving less as the junior directors were able to take up some of the extra work involved. This had involved his resignation from the chairmanship of Trade Promotion Trust, and that position had devolved upon Mr. A. R. Pain, who had been its mainstay since its foundation. Mr. Pain in turn had had to give up the secretaryship of Benn Brothers, Ltd., and that had given the directors an opportunity to recognise the excellent work of Mr. G. E. Gilman. He looked forward in a more optimistic way than usual to the year 1934-35. "I do not look for a big accession of profits," he said, "but I think the business world is settling down, and you may look to a continuance of your present business with a steady upward movement."

Sir Ernest Benn went on to refer to the question of the Press and circulation. "Twenty-five years ago," he said, "Lord Northcliffe conceived the idea that papers must have net sales, and in that connection selected for attack the late Sir John Benn and 'The Cabinet Maker.' From that day to this we have said that we will have nothing to do with circulation and will not do business on that basis, not because we have not got adequate circulation ourselves, but because the pursuit of net sales has dragged our great profession down to the unthinkable depths we have to witness to-day."

Mr. GORDON ROBBINS, deputy-chairman, in seconding the resolution, said that Sir Ernest Benn had consistently taken an interest in young men. Not only had the board been strengthened and encouraged by this added keenness of the young men of 1934; but the same tendency was showing itself right through the business. "We have at the moment," said Mr. Robbins, "in the editorial chairs, younger men than we have ever had before. On the managerial side too, youth is getting its chance. At the same time the veterans are not being prejudiced by the encouragement given to the younger men."

Mr. C. E. Hughes was re-elected a director and Messrs. Cassleton Elliott and Co., were re-elected auditors.

Craftsmanship and Draughtsmanship

The Physical Society's Competition

IN 1930 an annual competition in craftsmanship and draughtsmanship was inaugurated by the Physical Society to encourage those youths who aspire to a high standard in their work. This competition for apprentices and learners is organised in connection with the Society's annual exhibition of scientific instruments and apparatus which is held in January each year. Commenting upon the last competition in the Journal of Scientific Instruments, Mr. R. W. Paul wrote: "At present the principals of some of our leading concerns appear to take no active steps to encourage their apprentices to compete in the craftsmanship competition, so that the interest taken in the workshops varies greatly. Obviously the provision of facilities for executing the simple job which suffices to show an apprentice's skill involves some altruism on the part of the firm for the benefit of the industry, but regard should be had to the beneficial effect on the workers of the spirit of emulation aroused, and the good effect on the morale of the shops. The stimulus given by the competition to candidates is know in many cases to have had a beneficial effect on their careers. Further, it is believed the competition does something to raise the international status of our instrument trade."

Manufacturers who have permitted their employees to compete have observed that a notable and healthy influence has been introduced into the factory, and the competition is worthy of commendation to those firms who have apprentices or learners eligible to take part in the next competition.

From Week to Week

THE ADDRESS of the Institute of Patentees has been changed from 39 Victoria Street, to 10 Victoria Street, London, S.W.1.

THE NOMINAL CAPITAL of Colrex Products (Gt. Britain), Ltd., manufacturing chemists, soap manufacturers, etc., 92 Upper Thames Street, E.C.4, has been increased by the addition of £5,000 in £1 ordinary shares beyond the registered capital of £5,000.

FORTY BARRELS OF KEROSENE OIL surrounded by tar provided a spectacular blaze at Cruicks Quarry, Inverkeithing, last week. At the height of the fire the barrels bust, causing loud explosions. The plant, which was valued at £2,000, was only slightly damaged.

MR. FRED J. JOHNSTON, of Kinnaird House, Turriff, Aberdeenshire, has received an appointment as a draughtsman with Imperial Chemical Industries, Ltd., at Stockton-on-Tees. Mr. Johnston served his apprenticeship as a draughtsman at the tool works, Fraserburgh.

IN MAKING THEIR RECENT RECOMMENDATIONS for a revision of the silk and artificial duties, the Import Duties Advisory Committee pointed out that the reduction in the duties on raw materials rendered it necessary to reconsider the rates of drawback on manufactured goods. Bearing in mind, however, the fact that British manufacturers would have stocks of materials on which duty had been paid at the higher rates, the committee recommended that the existing drawback rates should be continued for a time.

THE ANNUAL REPORT on patents and designs in India for the past year shows a marked increase in the number of applications for the protection of inventions relating to structural steel. It is thought that this is due to the proposals to use special alloy steels in the construction of the new Howrah bridge. A new process relating to metal photography, for which a patent has been applied, is hailed in the press as having a great future. Electrical and textile inventions show signs of falling off. Chemical industry inventions, however, are increasing and the manufacture of tea has been responsible for several inventions.

THE INTERNATIONAL SUGAR CONFERENCE at Brussels reached a deadlock on August 2, and has been adjourned until the end of September, when it will again be convened in Brussels. The nine adherents of the Chadbourne Plan represented at the Conference found it impossible to devise a new agreement on export quotas which would prove durable and compatible with the world plan which was the essential objective of the Conference. In spite of the failure to reach a definite agreement, sufficient progress has been made during the present week's discussions to warrant expectations of a permanent settlement at some later date.

THE GOVERNING COUNCIL of the Indian Institute of Science has appointed Professor G. R. A. Kon as professor in charge of the Organic Chemistry Department. Professor Kon is a distinguished scientist working at the Imperial College, London. His appointment will be subject to the approval of the Viceroy. The Council has also appointed Professor Maxdourne of Cambridge University as Reader of Theoretical Physics, while Professor George Havesy is appointed Reader in General Chemistry. Both these appointments are made for six months in the first instance. Two other vacancies have yet to be filled, namely the professorship of General Chemistry which fell vacant consequent on Dr. Watson's resignation, and the professorship of Electro-technology department, which fell vacant on Professor Mowdavala's resignation.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of the following products from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act; Acidol (betain hydrochlorate); anaesthesine (ethyl p. amido benzoate); coryfin (ethyl glycollic ester of menthol); N-methyl-C-C cyclohexenyl methyl malonyl urea and its sodium salt; holocaine (di-ethoxy diphenyl ethenyl amidine hydrochloride; luminal (phenyl ethyl malonyl urea) and its sodium salt; melubrin (sodium phenyl dimethyl pyrazolon amino methane sulphonate); orthoform (methyl-m-amino-p-oxybenzoate); N-methyl ethyl phenyl malonyl urea; sajodin (calcium mono iodo behenate); salophen (salicylic acid ester of acetyl p. amidophenol); mercury sodium salicyl allyl amino o-acetate; 4-oxy-3-acetyl-amino phenyl arsinic acid; spirosal (mono glycol ester of salicylic acid); theocine (theophylline); theophylline sodium acetate; valyl (valeryl diethylamide); istizin (istin; 1 : 8 dioxanthraquinone); 4-oxy-3-ethyl amino phenyl arsinic acid-n-methyl tetrahydro pyridine B-carboxylic acid methyl ester; hydroxy chlorphenol mercury sulphate; methyl anthranilate; B-naphthol ethyl ether and B-naphthol methyl ether (Nerolin). The ground of the representations is that the products are not made, and are not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communications (quoting reference I.M. 1506/34) should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than August 26. A similar representation has been made with regard to cyclohexenyl ethyl malonyl urea. In this case the last date for communications is August 29.

THE DEATH OCCURRED at Kilmacolm on August 3 of Mr. J. H. Barrett, formerly a director of J. and J. White, Ltd., of Glasgow.

THE BLAST FURNACES AND STEELWORKS of Palmers Shipbuilding and Iron Co., Ltd., at Jarrow, have been acquired by Thomas W. Ward, Ltd., of Sheffield. It was announced recently that Palmers' shipbuilding yard at Jarrow had been taken over by National Shipbuilders Security, Ltd.

THREE HUNDRED MEN AND WOMEN EMPLOYEES of the British Silk Dyeing Co., Ltd., at Balloch, stopped work last week in a wages dispute with the management and marched into Alexandria as a protest. A deputation from the dyeing house visited the manager with a request for a penny an hour increase, which was refused. An alternative offer of ½d. an hour increase was made to the operatives, who refused it and declared a lightning strike.

IN THEIR REPORT for 1933, the directors of Buell Combustion, Ltd., say that since the close of the year the rights of an important new type of mill, particularly suitable where very fine grinding is essential, have been acquired. The company has issued 4,292 fully paid shares as part consideration for the acquisition of the assets of Buell Combustion (Foreign), Ltd. The accounts for the year show a net loss of £5,315, making a total deficiency to be carried forward of £23,784.

THE ANNUAL REPORT of the Glasgow Corporation Gas Department states that the four chemical works have been maintained in a good state of repair throughout the year, and work has proceeded smoothly. The dephenolating plant is now in operation, and, with the completion of the concentration plants at Dalmarnock and Tradeston, and the making of sulphate of ammonia only at Provan chemical works, improvement in the waste liquors, from the sewage department's point of view, is anticipated. The volume of business done was quite satisfactory, but prices, particularly in pitch, tended lower as the year proceeded.

THE SLIGHT RISE in the number of registered unemployed during the six weeks ended June 25 was continued in July. An addition of 2,205 was recorded in the last monthly returns, and, when the figures for July are published, they are expected to show a further increase of about 3,000. If this figure is added, it brings the total number of registered unemployed in the country up to just over 2,095,500. The rise in the total, despite an improvement in certain trades, was attributed in June to temporary stoppages of work in the coal mining industry in consequence of the hot weather and the seasonal slackening in other industries. An additional factor in July was the unusually large number of children leaving school.

MORE THAN 92 PER CENT. of the available indoor exhibition space at the heavy section of the 1935 British Industries Fair, which is to be held in Birmingham in May, has been applied for by prospective exhibitors ten months in advance of the opening date. The outdoor exhibition area at Castle Bromwich is being increased from 50,000 sq. ft. to 200,000 sq. ft. As in previous years, the London Section of the 1935 Fair will be held in February and March. At Castle Bromwich there is available a total indoor exhibition area of 263,000 sq. ft. Applications have already been received for some 242,917 sq. ft., or more than 92 per cent. of the available space. In addition to applications from former exhibitors there are 152 from firms which have not exhibited at Castle Bromwich in previous years.

TIN STATISTICS showing the position at the end of July have been awaited with unusual interest owing to the widely-held opinion that, at its meeting a fortnight hence, the International Tin Committee will decide upon the quotas for the half-year commencing on October 1. The statistics which have just been issued may fairly be said to support the case for a slight reduction of the quotas, for they are somewhat more unfavourable than had been expected. Visible supplies are estimated at 15,929 tons, compared with 16,730 tons at the end of June. This contraction under that heading, however, is more than counterbalanced by an increased carry-over at the Straits Settlements and the larger stocks held at the Holland smelter. The latter now amount to 2,166 tons, against 1,693 tons a month ago.

THE BUSINESS ADMINISTRATION DEPARTMENT of the London School of Economics has started a scheme of business training for University graduates, the main object being to bridge the gap between the business world and the universities. Candidates must be University graduates who have recently taken their degrees. They are required to defray the expenses of their training, but these are at a modest level. When they have completed the course, they will be assured of definite posts, and will be afforded good openings and opportunities. The principal work of the Department is to provide selected students with a full-time training in the principles of business administration. Special attention is paid to the practical side, this being provided by discussions with business men, visits to factories, offices, etc. Further information concerning this scheme may be obtained from Mr. Jules Menken, 11 Clement's Inn Passage, W.C.2.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE is very little news from the chemical markets this week. Business has been steady but quiet generally. Among industrial chemicals, acetone, formaldehyde, oxalic and formic acids show very fair demand, while in the coal tar products market, interest in creosote oil and cresylic acid continues; most other products, however, show little activity. It is not expected that there will be many large orders this month. Although a fair amount of interest is shown in cream of tartar, citric and tartaric acids, business in pharmaceutical chemicals has been limited. Activity in the essential oils market remains steady.

LONDON.—Prices generally still remain very steady and for the time of the year a fair amount of business is being booked. The coal tar products market is firm and prices remain the same as last week.

MANCHESTER.—Business on the Manchester chemical markets this week has made an extremely slow recovery after the holiday week-end and the attendance on the Manchester Royal Exchange on Tuesday's resumption in the chemical section was relatively small. The fact that a number of towns in Lancashire are again on holiday for the whole of the present week has adversely influenced the movement of many classes of materials, and these conditions are expected to continue until about the end of the third week in August, after which, providing no unforeseen circumstances arise, there should be a recovery to more normal working conditions. New business this week has been slow in all departments, and little fresh buying of any consequence has been reported. Steadiness has again to be reported in most departments, although indications of easiness in respect of some of the by-products continue in evidence, carbolic acid crystals, in particular, having further drooped. Export bookings in pitch continue poor.

SCOTLAND.—There is little of moment to record in the Scottish heavy chemical market as the English holidays are definitely having a quietening effect.

General Chemicals

ACETONE.—LONDON. £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—9d. per lb. less 5%.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £43 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE. SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3⅞d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10⅝d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £26 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £31 10s.

LEAD, NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 10s.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¾d.; B.P., 9⅜d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8⅝d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

RUPRON (MINERAL RUBBER).—£15 10s. per ton.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £18 10s. per ton d/d *1-cwt. iron drums for home trade.*

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: *Commercial, £9 5s.; photographic, £15.*

SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SULPHUR.—£9 15s. to £10 per ton.

SODIUM SILICATE.—*140° Tw. Spot £8 per ton d/d station, returnable drums.*

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: *For home consumption, Solid 60/62%, £10 5s.*; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.

ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8⅛d. to 8¾d. per lb.; crude, 60's, to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 1s. 11d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 6d.; dark, 95/97%, 1s. 3d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 4d. to 4¼d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3½d. f.o.r. North; 4d. London. MANCHESTER: 3½d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium soft, 57s. 6d. per ton, in bulk, at makers' works. LONDON: £3 to £3 1s. per ton f.o.b. East Coast port for next season's delivery.

PYRIDINE.—90/140, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d. per gal.

TOLUOL.—90%, 2s. to 2s. 1 per gal.; pure, 2s. 3d. to 2s. 4d.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.

BENZIDINE HCL.—2s. 5d. per lb.

p CRESOL 34-5° C.—*2s. per lb. in ton lots.*

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

o-NITRANILINE.—3ss. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—9½d. to 11d. per lb.

p-TOLUIDINE.—1s. 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The price for neutral quality, basis 20.6 per cent. nitrogen, for delivery to farmer's nearest station carriage paid in 6-ton lots is as follows:—1934: August £6 14s. 6d., September £6 16s., October £6 17s. 6d., November £6 19s., December £7 0s. 6d.; 1935: January £7 2s., February £7 3s. 6d., March/June £7 5s.

CYANAMIDE.—Delivered in 6-ton lots:—1934: August £6 15s., September £6 16s. 3d., October £6 17s. 6d., November £6 18s. 9d., December £7; 1935: January £7 1s. 3d., February £7 2s. 6d., March £7 3s. 9d., April/June £7 5s.

NITRATE OF SODA.—Basis 15½% or 16% nitrogen, for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station, £7 12s. 6d. per ton.

NITRO-CHALK.—Basis 15.5% nitrogen, for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station, £7 5s. per ton.

Latest Oil Prices

LONDON, Aug. 8.—LINSEED OIL was steady. Spot, £22 10s. (small quantities 30s. extra); Aug., £20 17s. 6d.; Sept.-Dec., £21 10s.; Jan.-April, £21 7s. 6d., naked. SOYA BEAN OIL was firm. Oriental (bulk), Aug.-Sept. shipment, £18 per ton nominal. RAPE OIL was quiet. Crude extracted, £27; technical refined, £28 10s., naked, ex wharf. COTTON OIL was dearer. Egyptian crude, £13; refined common edible, £16 10s.; and deodorised, £18, naked, ex mill (small lots 30s. extra). TURPENTINE was dull. American, spot, 41s. 3d. per cwt.

HULL.—LINSEED OIL, spot, quoted £22 2s. 6d. per ton; Aug., £21 12s. 6d.; Sept.-Dec., £21 15s.; Jan.-April, £21 12s. 6d., naked. COTTON OIL, Egyptian, crude, spot, £13 10s.; edible, refined, spot, £15 10s.; technical, spot, £15 10s.; deodorised, £17 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £14, naked. GROUNDNUT OIL, extracted, spot, £20; deodorised, £24. RAPE OIL, extracted, spot, £26; refined, £27 10s. SOYA OIL, extracted, spot, £17; deodorised, £20 per ton. COD OIL (industrial), 25s. per cwt. CASTOR OIL, pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE, American, spot, 43s. 3d. per cwt.

THE text of the Irish Industrial Alcohol Bill has just been issued, under which Bill it is provided that the Irish Free State Government will henceforth assume the monopoly of manufacturing this commodity in the Free State. The Minister for Industry and Commerce proposes to have four factories established as an initial stage of the development. It is estimated that this will cost the Government £120,000.

Inventions in the Chemical Industry

Abstracts of Patent Specifications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each.

Purifying Hydrocarbons

Impurities such as sulphur are removed from gaseous hydrocarbons by contact with a fused hydroxide, chloride or other compound of an alkali or alklaine earth metal containing a proportion of the free metal uniformly mixed therewith. The fused compound is passed continuously through an electrolytic cell for partial decomposition and then through the reaction chamber. See Specification No. 13,973 of J. F. Wait.

Extracting Fatty Oils

Oil is extracted from the fatty material obtained from whale and other mammiferous sea animals by heating the material in a bath of oil obtained from these animals, the oil being applied hot, and, after having transferred its heat to the material, is removed and reheated, preferably not to over 90° C., away from the material and then returned thereto. The process may be carried out under vacuum and operated continuously or periodically. See Specification No. 407,728 of J. O. Nygaard.

Cleaning Metal Surfaces

Surfaces coated with oil-sludge are cleaned by phenol, cresol, or other coal-tar phenols, with or without diluents, *e.g.*, tar distillates or petroleum distillates. For example, oil headers and oil-filled electric transformers are freed from sludge by filling the emptied vessel to a suitable height with commercial carbolic acid, injecting steam for about 2 hrs. to throw the acid over the whole of the surfaces, running off the acid, and rinsing the vessel with dilute alkali and with water. See Specification No. 22,832 of A. Duckham and Co., Ltd., and S. E. Bowrey.

Chromates

Chromates for use as anti-corrosion agents are precipitated by adding lead nitrate or the nitrate of a metal the oxide of which is substantially insoluble and is more basic than lead oxide to an excess of sodium or potassium chromate. In addition to lead nitrate, the nitrates of barium, strontium, calcium, and zinc are specified. Precipitation is preferably effected at the boiling point of the solutions used. A statement of the art refers, *inter alia*, to the addition of powdered metallic zinc to barium chromate; to the subjection of red lead to the action of a chromate solution; and to the treatment of pigments with potassium bichromate. See Specification No. 34,546 of W. V. Gilbert.

Cellulose Ester Coating Compositions

Coating compositions are made by dissolving a cellulose ester in a vehicle consisting of a hydroformed solvent made by destructive hydrogenation in the vapour phase of a hydrocarbon, and distilling the resulting oils to produce a fraction boiling about 122—320° F. The hydroformed solvents may be used in admixture with aromatic solvents such as benzene, toluene or xylene or with aliphatic ketones, alcohols such as amyl, butyl, isopropyl alcohol or their esters, to form vehicles for lacquers. For example, a lacquer is prepared by dissolving nitrocellulose in a vehicle consisting of hydroformed solvent, butyl acetate, butyl alcohol, ethyl acetate and dibutyl phthalate or castor oil. Ester gum or phthalic-glyceride resins may be added together with turpentine and pigments. See Specification No. 261,039 of Standard Oil Development Co.

Alcohol

Ethyl alcohol substantially free from ether is produced by treating a mixture of ethylene and steam with sulphuric or phosphoric acid of 15—60 per cent. strength at elevated temperatures and at 1,000 lb. pressure or more. The temperature may be 170—300° C. and the pressure one to several thousand pounds or higher. The steam is preferably used in excess. A small proportion of a lithium salt may be added as a promoter. The acid may contain filling material to effect intimate contact, or may be absorbed in carriers such as pumice or silica gel. In examples, equal parts of ethylene and steam are passed: (1) into 30 per cent. sulphuric acid at 255—260° C. and 1,000 lb. pressure; (2) into sulphuric acid of 18—20 per cent. at 255—260° C. and 2,000 lb. pressure. Specifications 368,051, 368,935, and 370,136 are referred to. See Specification Nos. 368,935, 370,136 of H. G. C. Fairweather.

Lead and Zinc Lactates

Lead and zinc lactates are produced by adding the corresponding carbonates to a lactic acid solution produced by treating vegetable and other food residues from household refuse first with "fission fungi" or moulds to convert cellulose and starch into simpler carbohydrates, and then with lactic bacteria such as B. Delbruckii. See Specification No. 31,041 of Bamag-Meguin, A.-G.

Lubricants

Consistent grease is obtained by cold mixing split blubber oil, split oil or fat other than castor or blubber oil, mineral oil, and alkali; split castor oil may be added. For example, 5 kg. of blubber oil about 55 per cent. split, 5 kg. of castor oil about 49 per cent. split, 150 kg. of bone-fat or tallow about 75 per cent. split, 2000 kg. of fluid mineral oil, and 60 kg. of 47° Bé caustic soda are thoroughly mixed. See Specification No. 8794 of G. J. C. Beckmann.

Soaps and Solvents for Dry-Cleaning

Soaps for use with dry-cleaning solvents, especially carbon tetrachloride or trichlorethylene, consist of a fatty acid soap with a content of a polyglycol, and with or without a chlorinated aliphatic hydrocarbon. For example, 14.2 gm. of caustic soda is dissolved in 25 c.c. of water and stirred into 100 gm. of oleic acid in 100 c.c. of trichlorethylene; 70 gm. of triethylene-glycol or 50 c.c. of diethylene glycol is added; the product is dissolved in trichlorethylene for dry-cleaning. See Specification No. 25,677 of Roessler and Hasslacher Chemical Co.

Stabilising Gasolenes

Cracked gasolenes and other motor fuels are stabilised by addition of an acyl derivative of a di- or tri-hydric phenol. 0.005—0.1 per cent. is suitable. Specified compounds are the acetyl, propionyl, butyryl, valeryl, capryl, heptylyl, caprylyl, caproyl, palmityl, stearyl, oleyl, salicylyl, benzoyl, toluyl, ethylbenzoyl, tolyl acetyl, and phenyl acetyl derivatives of pyrogallol, phloroglucinol, 1.2.4. trihydroxybenzene, pyrocatechol, resorcinol, and hydroquinone; they may be used in solution, *e.g.*, in acetone, benzol, alcohol. In an example 35 lb. of benzoyl pyrogallol or butyryl pyrogallol is added to 1,000 barrels of vapour-phase cracked gasolene. See Specification No. 20,267 of A. H. Stevens.

Sodium Chloride

To maintain the sprinkling capability of finely granular table salt, an amount up to 7 per cent. of potassium chloride is added. In the preparation from common or cooking salt, the mother liquor may be enriched in potassium chloride so that the sodium chloride separates out with the desired content of potassium chloride, or the potassium chloride may be added to the finely granular still moist salt obtained after separating the main portion of the mother liquor. In the preparation from rock salt, the potassium chloride is added during the grinding or sieving; its action may be enhanced by adding it as a concentrated solution before the drying operation. Anhydrous alkali or alkaline earth phosphates including disodium phosphate, magnesium monohydrogen phosphate and calcium monohydrogen phosphate may also be added to increase the action of the potassium chloride or to allow the amount thereof used to be diminished. See Specification No. 9,435 of W. W. Triggs.

Bleaching Clay

Finely disintegrated argillaceous material such as kaolin, preferably after separation of the relatively coarse fraction, is suspended in air or other gaseous medium and subjected in suspension to the action of a bleaching agent such as chlorine, hydrogen chloride or sulphur dioxide, with or without bromine or oxides of nitrogen. The kaolin, etc., may be first treated with chlorine and then with sulphur dioxide, or after treatment with chlorine or hydrogen chloride be leached on the counter current principle with hydrochloric acid which may contain an alkali metal salt such as sodium chloride, nitrate, or bisulphite. The colour of the final product may be improved by treatment with a soluble cyanide. In carrying out the process the kaolin may be passed through roll crushers between the various treatments, the separation between the rolls being decreased at each stage. Screen or air classifiers follow the crushers. Flow sheets for the process are included in the Specification. See Specification No. 34,097 of Allied Process Corporation.

Metallic Oxides

A lead compound is prepared by treating red lead with dilute nitric acid and interrupting the treatment before lead peroxide is formed to any considerable extent. In an example, 1000 grams of red lead are treated with 333 c.c. water and 600 c.c. of nitric acid S.G. 1.4 diluted with 840 c.c. water. The treatment is interrupted after fifty minutes and the brown residue washed. See Specification No. 25,770 of Rulag Battery Co.

Catalytic Processes

Catalysts for dehydrating, hydrogenation, dehydrogenation and cracking processes, *e.g.*, metallic oxides such as those of aluminium, chromium, thorium, tungsten, modybdenum, beryllium and zirconium, clay, silica and aluminium silicates are prepared by drying the bodies prior to use at a temperature, *e.g.*, 500—700° C. or higher, which is higher than that at which they are to be used. See Specifications Nos. 263,082, 276,007, and 302,354 of Société des Carburants Synthetiques.

Zinc Sulphide

Pure zinc sulphide, giving a bright blue fluorescence, contains substantially less impurity than 1 part in 100,000. It may be prepared by precipitation from aqueous zinc salt solutions with sulphuretted hydrogen. Sintering and fusing in the presence or absence of fusible salt additions may also be employed. A zinc cadmium sulphide of a similar degree of purity may also be employed. See Specification No. 24,630 of Telefunken Ges. Für Drahtlose Telegraphie.

Alkali Humates

Colloidal suspensions of peat are obtained by heating in an open vessel and in the presence of water, peat and an alkali in sufficient quantity to render the suspension neutral or mildly alkaline. The preferred alkali is sodium carbonate. Heating is preferably effected by blowing steam under pressure into a container in which the peat and alkali are placed in layers. The suspension may contain a suspensory agent, such as gluten and starch. See Specification No. 312,233 of J. J. E. Pugh.

Thorium Phosphate

Thorium phosphate in the form of a gel with a density less than 1 is prepared by precipitating a solution of monazite in sulphuric acid by a large dilution with water in the cold sodium pyrophosphate is added in amount sufficient to precipitate the residual thorium in solution. A small quantity of an alkaline substance such as magnesia may be mixed with the thorium phosphate to form an insoluble salt with any phosphoric acid set free by decomposition. See Specification No. 10,958 of Société Minière et Industrielle Franco-Bresilienne.

Metal Carbides

Hard carbides of metals such as titanium, molybdenum, tungsten, etc., containing free carbon are formed by heating mixtures containing the finely divided oxides of the metals and an excess of carbon in a graphite cylinder, plugged at both ends, in a hydrogen furnace. Mixed carbides containing free carbon may be prepared by reducing, or oxidising, double salts or mixed salts of the metals to produce alloys or oxides which are subsequently carburised. See Specification No. 32,696 of A. H. Stevens.

Making Emulsions

Aqueous emulsions of fat dissolving agents, such as light or heavy benzines or trichlorethylene, are obtained by the use as an emulsifying agent of a thinly fluid acidified mucilage of carrageen, agar-agar, Irish moss or similar bodies which has been freed from thickeners, *e.g.* by centrifuging. According to an example, a carrageen jelly is made by treating 6 parts of dried moss with 82 parts of water. The temperature of the mixture is raised slightly and the jelly freed from thickeners in a centrifuge, giving 80—85 per cent. of a thin mucilage. This is mixed with approximately 3—4 per cent. of oxalic acid and used to emulsify fat dissolving agents. The resulting emulsion is miscible with water in all proportions. See Specification No. 23035 of W. H. Wilcken.

Varnishes

Plastic or syrupy materials obtained by heating castor oil with a half ester of maleic acid are compatible with nitrocellulose and may replace drying oils in oleo-resinous varnishes. In example, the reaction product of maleic anhydride, x-terpinol and castor oil is mixed with a natural or synthetic resin, a drying oil and cobalt resinate to yield a varnish. See Specification No. 4922 of Resinous Products and Chemical Co.

Wax-like Compositions

Wax-like bodies are formed by melting together a chlorinated naphthalene and a resin oil or a mixture of resin oil and solid resin, pigments or fillers being added if desired. The proportion of resin oil or mixture employed does not exceed about 10 per cent. by weight of the chlorinated naphthalene. Specifications 9023/11, 259,409 (both in Class 22), and 349,981 (Group V), are referred to. See Specification No. 23,844 of C. W. Richards and Imperial Chemical Industries, Ltd.

Titanic Hydroxide

The hydrolysis of a solution of a titanium salt such as the sulphate is effected after addition of titanic hydroxide which has been precipitated and then dispersed or peptised. The dispersion, which preferably has a *p*H value less than 2 and is capable of passing through filter paper but not through a collodion membrane, may be prepared by boiling a dilute solution of a titanium salt, washing the precipitate and dispersing it with an acid such as nitric acid. The hydroxide precipitated by the process may be wholly dispersed, a part be used for the hydrolysis of another batch of solution, and the remainder be worked up for use as a pigment. See Specification No. 13,719 of B. Laporte, Ltd.

Hydration of Olefines

The hydration of olefines, for instance the production of alcohol or ether from ethylene, is effected by treating the olefine with liquid water in the presence of salts of weak acids which are capable of existing in anhydrous and hydrated forms or in two or more hydrated forms. Suitable salts are borax, sodium potassium molybdate, solium and calcium tungstates, sodium orthovanadate, calcium metavanadate, barium metantimonate, and trisodium arsenate. The reaction may be effected at temperatures above 100° C. under sufficient pressure to keep the water in the liquid form. Other olefines such as propylene and butylene may be treated similarly. See Specification No. 24,954 of H. Dreyfus.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Cyprus.—A Larnaca agent desires to represent United Kingdom exporters of Empire sugar on a basis to be arranged. (Ref. No. 125.)

South Africa.—H.M. Trade Commissioner at Johannesburg reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 352), to be presented in South Africa by September 17, 1934, for the supply of disinfectant fluid which will be required during the period January 1—December 31, 1935. (Ref. F.Y. 2097.)

Finland.—A firm established at Helsingfors desires to obtain, on a commission basis, the representation of United Kingdom manufacturers of zinc white, kaolin, and talc, and United Kingdom exporters of sugar. (Ref. No. 139.)

Korea.—A merchant firm in Seoul, the proprietor of which is expected to visit the United Kingdom in early August, wishes to establish connections with United Kingdom manufacturers of pharmaceutical chemicals and druggists' sundries. (Ref. No. 144.)

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